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INDEX PAGE 37

The OIL WEEKLY

FOR THE DRILLING, PRODUCING, PIPE LINE INDUSTRY

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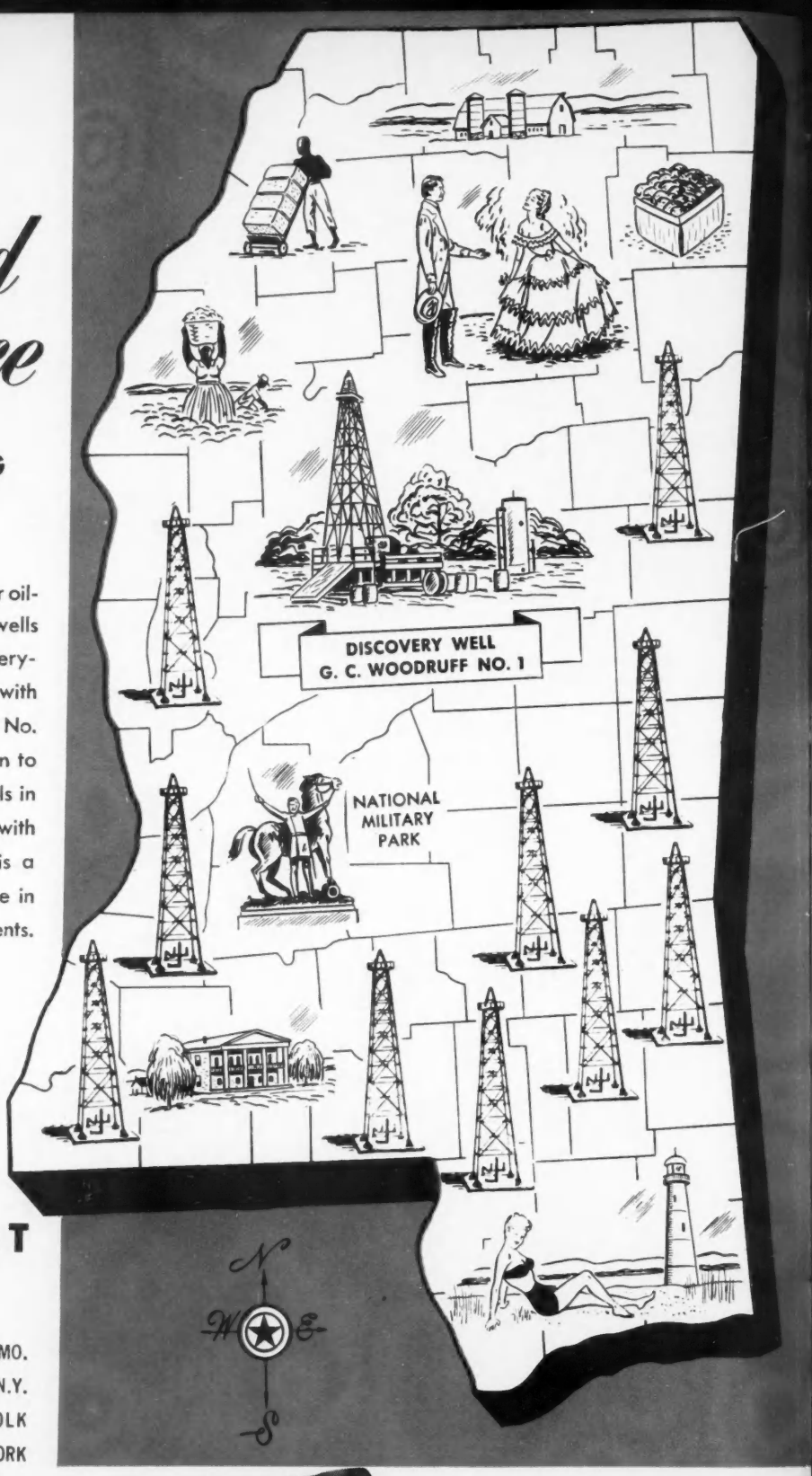

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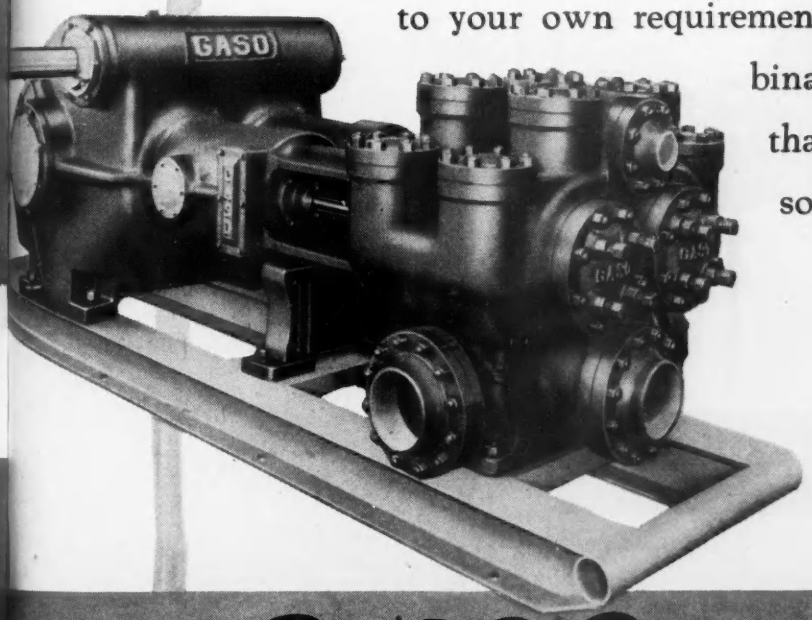

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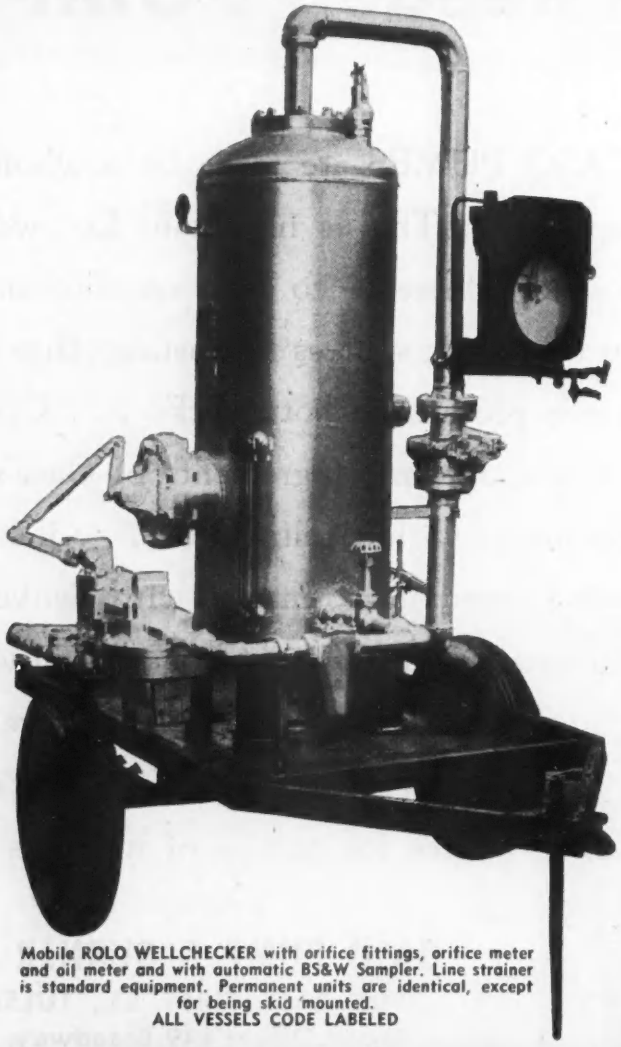

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Looking Ahead

WITH THE EDITOR

THE American Petroleum Institute's 26th Annual Meeting, to be held in Chicago November 11-14, will be featured in the editorial pages of the November 18 and November 25 issues of THE OIL WEEKLY.

The issue of November 18 will publish complete news coverage of all sessions of interest to the producing, drilling and pipe line branches of the industry, and in addition will carry complete texts of some of the papers which will be presented. In the issue of November 25, additional papers will be published in complete form.

Many excellent papers have been prepared for presentation by some of the outstanding engineers of the industry, and by devoting two issues to the Institute meeting THE OIL WEEKLY will be able to bring a large number of these to its readers. Most of the papers to be published in these two issues in complete form will consist of technical papers presented at sessions of the Division of Production.

The Division of Production is to sponsor three group sessions during the convention, viz.: a symposium on secondary recovery; a session on production technology; and a session on production problems.

At the four general sessions some of the leaders of petroleum and other businesses are to be heard. Some of the papers to be published in complete form will include a few of these general session addresses.

In order to provide comprehensive news coverage of the meeting, several members of THE OIL WEEKLY staff will attend.

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The OIL WEEKLY

ENGINEERING NEWS STATISTICS

R. L. DUDLEY, President, Publisher A. L. BURNS, General Manager

Contents — NOVEMBER 11, 1946

VOLUME 123, No. 11

Technical and Feature Articles

TEMPERATURE WELL LOGGING, PART 4 50
By Hubert Guyod

HARD-FACED VALVE SEATS EXTEND PUMP LIFE 54
By Elton Sterrett

SALT QUICKLY CLEANS FLOW LINES 57
By L. N. Scheuermann

FUNDAMENTALS OF INDUSTRIAL ACCIDENT PREVENTION, PART 12 62
By C. L. Hightower

ACIDIZING INCREASES WATER INTAKE RATES 70
By R. J. Ffister

ACCOUNTING FOR PROFITS ON DRILLING CONTRACTS 78
By H. O. Reyburn

CLAY RESEARCH AND OIL DEVELOPMENT PROBLEMS 82
By Dr. J. C. Griffiths

FPC THREATENS GAS CONSERVATION AND SUPPLY 90
By Hines H. Baker

PRODUCTION HINTS 92

News and Departments

LOOKING AHEAD 2
THE OUTLOOK 39
THE CHANGING PANORAMA 41
THE WEEK'S NEWS 43
CRUDE PRODUCTION 45
PIPE LINE NEWS 47
INTERNATIONAL NEWS 48
FIELD OPERATIONS 99
EXPLORATORY COMPLETIONS 121
SQUEAKS FROM THE BULL WHEEL 123
MEN IN THE INDUSTRY NEWS 124
MANUFACTURERS' NOTES 127
ADVERTISERS' INDEX 128

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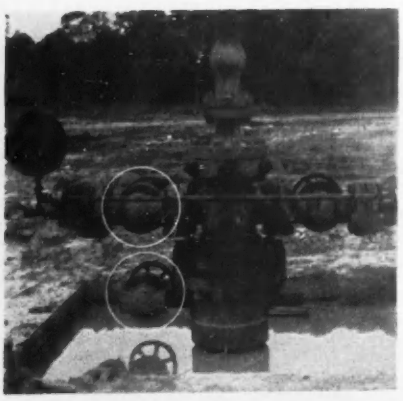

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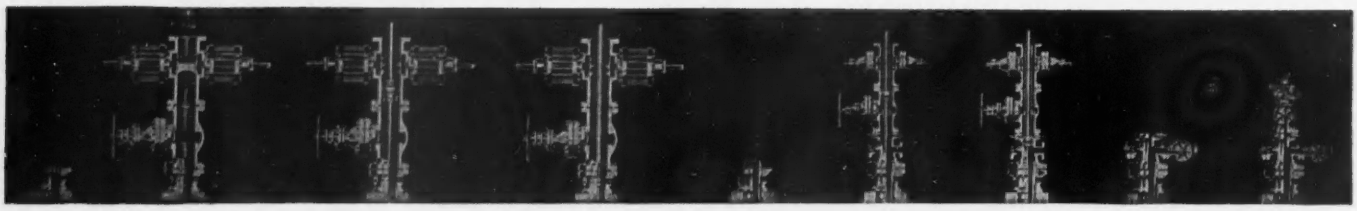

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The Changing Panorama

INDUSTRY-WIDE SERVICE THROUGH THE API

An Editorial

SCATTERED throughout the United States are numerous associations of oil men which are doing good jobs on specific problems in those areas. Many of these associations are doing a special work which could not possibly be done by a national association. Yet there is a genuine need for a general association to undertake the solution of nationwide problems which affect oil men wherever they may be within the confines of the U.S.A.

The American Petroleum Institute is the great nation-wide organization undertaking the solution of those national problems and the plans it has under way, plus accomplishments in the past, merit its serious consideration by oil men, both large and small. API is doing a good job in the limited scope in which it can operate, and it has plans for extending its work in a manner which should be of genuine interest to major and independent alike.

If we look the proposition straight in the face we must admit that the American Petroleum Institute has not had the support it should have had from numerous independents and that it has been considered a "major company" organization by many. But we think that now is the time to make a re-assessment of API.

It is quite understandable why API received the name of a "major oil company" association. To begin with it had its origin in the Petroleum War Service Board of World War I, the majority of whose members, appointed by the government, were officials of the large companies. It was a natural thing for the government to have selected these men, just as it was a natural thing for the Roosevelt administration to have set up the Petroleum Industry War Council in World War II which again was composed of representatives of practically all of the major companies, plus men representing smaller concerns or groups. After World War I, when API was organized, members of the PWSB largely made up the board of directors. That gave rise to the thought on the part of some that API was for the majors only.

Better Public Relations

If one were organizing a great national oil institute, we think that the first thing which would come into the minds of the organizers would be "What can such an association do that is not already being done? What can such an association do which really *needs* to be done?"

If we were setting out problems which could best be handled by a nation-wide, industry-wide association we believe that we would name the objectives thus:

1. *There is a genuine need for better relations between the oil industry and the American public.* Attacks on the oil industry (and there have been many) damage the entire industry, big companies and small independents alike. To be big in the eyes of some in government now is to be evil, as we know, but when the big ones are out of the way, never doubt that the smaller will be next. A nation-wide public relations campaign, based upon competent surveys of public opinion cannot be undertaken by other than a national association, an association of big companies and small ones alike. API, rather belatedly, it is true, is engaged in the primary stages of such a campaign and that on a basis of sound common sense, plus the advance information such a campaign requires.

Research Program

2. *There is a great deal of research necessary on the part of the oil industry.* Many of the smaller associations have undertaken specific research, and power to them for the foresight and energy to undertake their selected tasks! But many of the problems they have taxed themselves to undertake are problems of the entire industry and the burden of the research should be undertaken by the entire industry. A case in point is the research program of the American Association of Drilling Contractors relative to drill stem corrosion. The Pennsylvania Grade Crude Oil Association has undertaken research involving corrosion of other equipment and secondary recovery problems. These projects are splendid ones and do credit to the groups which originated them, but again, the entire industry will profit from the results of such research and the entire industry should help to pay for it through a national organization, leaving the individual associations to work on the numerous problems which are peculiar to their own members. API has done a great deal of research during the past, most of it of a fundamental nature. We think that API should expand its research and we have no doubt that it will.

3. *There are many problems peculiar to the oil industry which can be handled only by a national organization.* Standardization was one of these. It was not what would be called a "research" problem, although the compilation of a great deal of information was necessary to its successful efforts. Recently we read that the oil industry had saved $15 million as a result of standardization. We do not doubt it . . . and the entire production-pipe line industry shared in the saving, although API carried the ball. No doubt there will be many other problems involving possibly great savings to the industry which will arise in the future.

4. *Free and open discussion of the technical problems of the industry involving big companies and small ones is necessary to the progress of the industry. A nation-wide association should provide the forum.* One of the most effective things now being done by API involves discussions at the annual, at the mid-year, at district and even local meetings of API chapters. These discussions have been of the greatest benefit to all of the industry, because they cover subjects vital to all of the branches of the industry covered by API. These meetings and discussions are in the process of being expanded, a wise decision on the part of API, and no one, because of limitations in size, should deny his technical and operating personnel the opportunity of entering freely into them.

5. *There is need for a nation-wide organization to develop and disseminate statistical information of value to the entire industry.* This the API has been doing most successfully since its inception. API figures are not challenged because they are accurate. To depend upon the Bureau of Mines for figures which invariably come so late as to be ancient history is not to be thought of, and isn't thought of. This is said without intent to criticize the Bureau of Mines, but the lateness of Bureau of Mines figures is such as to require no additional comment.

API On the Job

So here are five substantial reasons for a nation-wide, industry-wide organization. API is on the job on all of them. They are non-controversial and everyone in the oil industry should support them.

Unquestionably there will be other things coming up on which an industry-wide front will be needed. We can think of one or two right now which may emerge in the future.

API is showing every evidence of desiring to serve the industry as a whole. It is showing evidence of desiring to cooperate and seek the cooperation of sectional and other associations. We think that these associations, and their members, should give every consideration to reciprocating the cooperation tendered. There is not, and cannot be any disposition on the part of API to supplant the work of these associations, but only to supplement it.

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The Week's News

IMPORTANT changes in administration thinking on oil policy may be forced as a result of last week's congressional elections. Discussions at the IPAA convention also are seen as raising barriers to extending federal controls. See below.

Tank Car Order—Civilian Production Administration has ordered railway equipment builders to concentrate on high pressure tank cars for liquefied gas.

Advisers to Europe—Charles B. Rayner, petroleum adviser to the State Department, has left for London where he will be joined next week by John A. Loftus, chief of the petroleum division, for petroleum discussions there and in other European centers. Rayner will return about December 15.

Rubber Plant Disposal—War Assets Administration has set up a special rubber plants and facilities branch to dispose of some 60 surplus plants—costing more than $600 million—producing raw materials, synthetic rubber and end products. Most of the plants have not yet been declared surplus.

Surplus Disposal Advice—The War Assets Administration is about to set up another special advisory board, this time to study all phases of surplus disposal. Wayne Chatfield, former Under-secretary of Commerce and president of the Export-Import Bank, is expected to head the board, which will have wide scope, and may be asked even to advise Administrator Littlejohn in the controversy of disposal of the Big Inch pipe line.

Object to IPAA Resolution—More objections have been registered to the IPAA resolution calling for defeat of the Anglo-American oil agreement. Page 44.

UN and Petroleum Matters—Reports that the United Nations was about to appoint a petroleum adviser were denied last week, but State Department officials are concerned last hasty UN action adds another to the many handicaps facing proposals for a world-wide oil agreement. Page 44.

Navy-Industry Training—Oil companies are cooperating with the Navy in giving on-the-job training to supply officers under a program designed to provide procurement specialists who will understand the difficulties encountered by industry in meeting Navy requirements.

Ball to OGD?—Although he terms it "just a rumor," it is believed that Max W. Ball of Michigan Consolidated Gas Company, will be tendered and will accept the job as OGD director. See below.

Intanglible Development Option—Regulations covering the option on intangible development expense have been tightened by Internal Revenue Bureau ruling. Page 45.

TGT Would Loop Line—FPC is being asked to approve TGT's application to loop more than 800 miles of its Texas-West Virginia natural gas line. Page 47.

Magnolia Plans Big Line—Magnolia has announced a big crude pipe line from its Corsicana, Texas, terminal to Patoka, Ill. Page 47.

Reciprocal Trade Hearings—Reciprocal trade agreement hearings have been announced by the State Department for early next year. Page 46.

Ball Expected to Accept OGD Post

Max W. Ball, currently connected with Michigan Consolidated Gas Company, last week denominated a report that he would be named director of OGD as "just a rumor," but there were indications that he shortly would be asked to reconsider the position he took when approached several months ago by acting Director Ralph K. Davies.

At that time Ball, a well known petroleum consultant and author, pointed out that he had been out of touch with the domestic industry because of his lengthy absence from the country, and also, that he had other commitments which would keep him busy until fall.

Reportedly, few candidates have been found for the job of taking the OGD out of its swaddling clothes and making it important in the industry and none of them measures up to Ball, who served for a time as special assistant to the Deputy Petroleum Administrator and prepared PAW's presentation before the O'Mahoney committee.

Friends of Ball point out that he is well known throughout the industry, has had wide and varied experience, and has never been closely tied to any particular faction. Davies, who has been out of the city, is expected to return this week and reportedly will formally tender the post to Ball in the near future. Also reportedly, Ball will accept.

Government's Peacetime Partnership With Oil Is Lacking Bright Prospect

Officials in Washington admitte dprivately last week that they see little chance of a real peacetime partnership between the oil industry and the government.

They based their opinion on the opposition of the Independent Petroleum Association of America to Senate ratification of the Anglo-American petroleum agreement and discussions showing large segments of the independents lined up against the National Petroleum Council, opposing any extension of Federal Power Commission authority and in favor of a national oil policy placing emphasis upon domestic exploration and development.

The position taken by the American Petroleum Institute this week on these and other similar questions will be watched with interest, but the view was expressed that the IPAA line was of importance because in matters requiring congressional action the independent businessman is given more consideration than his large and presumably more prosperous corporate competitor.

It was generally conceded that industry opposition to the Anglo-American agreement would definitely kill its chances of ratification in the Senate and, with it, quite likely all chance of a world-wide agreement such as has been envisaged by the State Department. With the two-way agreement shelved, it is believed Britain would be reluctant to take another chance of being turned down on an effort to rationalize the international oil situation. There is little likelihood that Russia would show much enthusiasm which would leave out two of the three most important oil countries.

Another indication that the oil industry places little reliance on a peacetime partnership with the government is seen in the lack of enthusiastic support for Truman's plan to correlate and centralize government oil activities through the Oil and Gas Division and the National Petroleum Council.

The council is working, but under some handicaps, and the search for a permanent head for the OGD is meeting difficulties, with men of the type who willingly manned PAW during the war showing no inclination for government peacetime service.

During the coming session of Congress, there will be much talk at that Capitol—on international agreements when the British pact comes before the Senate Foreign Relations Committee, on OGD activities when the appropriation committees study its requests for funds, and on national policy when the report to be made by Senator O'Mahoney's special oil committee is considered.

Out of those debates may come new conceptions of the relationship between the government and the oil industry, some of them no doubt prompted by

new members who in the past few years have been closer to industrial reality than men of long service whom they will displace.

UN Oil Adviser Report Brings Department Comment

Reports that the United Nations was about to appoint a petroleum adviser were denied last week, both in New York and Washington, but there was a possibility that if the UN takes over the job of liquidating UNRRA, which goes out of business at the end of the year, W. B. Uderski, now chief of the UNRRA fuel division, would be asked to take over the job of winding up its oil operations.

State Department officials feel that the UN should not appoint a petroleum adviser until it has some matters before it on which advice is necessary, and it was pointed out that so far the question of oil has not come up.

Any action by the UN in appointing an adviser, if such a step is taken, would have no connection with the proposal put forth last summer by John A. Loftus, chief of the State Department petroleum division, for negotiation of a world-wide petroleum agreement to be administered by the UN Economic and Social Council.

There is no challenge of the authority of the UN to get into petroleum matters and, in fact, it will get into them, in a remote way, if the proposed International Trade Organization now being planned in London by representatives of 18 nations is set up, since the ITO would deal with tariffs, preferences and other barriers which apply to oil as well as other commodities.

But while the UN can take up international oil matters, it can do so only if a proposal to that effect is laid before it, and at the moment, so far as can be learned, neither the United States nor Britain has any idea of doing that and Russia, the third great oil nation, apparently prefers to play a lone hand.

While the State Department's proposal for a world oil agreement contemplated the possibility that it might be placed under the UN, Charles B. Rayner, department petroleum adviser, has emphasized that its functions would be advisory only. Such an agreement could go to the UN only if participating countries agreed to such a step.

Accordingly, it was explained, the appointment of a petroleum adviser would not mean that the UN would be vested with any authority over oil by that action.

State Department officials are hopeful that the UN will not make any move toward setting up an office concerned with oil until the subject is definitely on its agenda, realizing that such an action would be immediately interpreted in many quarters as a back-door approach to UN intervention in international petroleum problems. Such a situation would serve only to stiffen opposition to any world-wide oil agreement and to the Anglo-American petroleum agreement which is the first step toward the greater arrangement.

Objections Registered to IPAA Pact Resolution

A. Jacobsen, president, Amerada Petroleum Corporation, and one of the advisers to the United States delegation at the London conference on the Anglo-American Oil Treaty, has taken exception to the resolution adopted by the Independent Petroleum Association of America which opposed ratification of the proposed treaty.

In a letter to B. A. Hardey, IPAA president, Jacobsen objected to the language of the resolution that "the members of the Independent Petroleum Association of America who aided in the negotiations of said treaty on September 25, 1945, are not satisfied with the construction placed upon the provisions of said treaty by representatives of the State Department, etc."

Jacobsen said he had not expressed himself in the sense indicated and said he was not aware and had never stated that any representatives of the State Department had placed any wrong construction upon the proposed treaty.

"The desirability of the ratification of the Anglo-American Oil Agreement," Jacobsen said, "is in no way affected by the fact that Messrs. John A. Loftus and Charles B. Rayner of the State Department have publicly expressed views and aims regarding international control of oil which are in conflict with some of the most important principles of the agreement; which go far beyond the scope and limits of the said agreement, and which in my opinion would be seriously prejudicial to our national interest as well as to the interests of our domestic and foreign oil industry. To these views and aims I am most strongly opposed, but they have nothing to do with the merits of the Anglo-American Oil Agreement as now written."

Ralph T. Zook, past president of IPAA and another adviser to the London delegation, has also announced that he is "in complete disagreement with the resolution."

Hardey, who took no part in the debate, has expressed the opinion that the resolution was "much ado about nothing" in that he believes the treaty to be "dead" anyway.

Joseph E. Pogue, vice president, Chase National Bank, New York, in a letter to Hardey, termed as "unfortunate" IPAA's opposition to the Anglo-American Oil Agreement.

Pogue, well-known oil economist, declared that if the latest effort of IPAA should result in the rejection of the treaty "I am afraid that the final outcome may be a new agreement drawn at some future date in time of economic crisis which would be an improvised emergency measure far less favorable to the interests of the industry and the independent producer than the present agreement."

World Oil Control Opponents Alert

(An Editorial)

WE ARE sorry that the IPAA passed a resolution condemning the proposed Anglo-American Oil Treaty. THE OIL WEEKLY would have preferred to have seen IPAA pass the Hill resolution urging the Senate to make it clear that the treaty was not to be construed as the initial move toward any control not provided for in the treaty itself. However, the action of IPAA members in urging that the Senate reject the treaty is thoroughly understandable.

Members of the Independent association, many of whom were willing to accept the treaty as revised, feared that an effort would be made by government bureaus to use the treaty for something not contemplated in the treaty itself, and they preferred its destruction rather than to take a chance.

The Army, Navy and State Departments have only themselves to thank for arousing this active suspicion. Messrs Loftus, Rayner and Vogel, who in all probability did not originate the idea which they gave voice to over a nation-wide radio hook-up, must take the blame.

Of course the action of IPAA in condemning the proposed treaty is not conclusive, because the treaty may be passed anyway, but the independent vote at least will serve as notice to proponents of world oil control that their machinations will be closely watched.

Caldwell Named Executive Of Louisiana-Arkansas Unit

A. R. Carmody, vice president of the North Central Oil Company, of Shreveport, was re-elected president of the Louisiana-Arkansas division of the Mid-Continent Oil and Gas Association in annual meet at Shreveport last week.

The five vice presidents, all of Shreveport, re-elected are: John J. Frommer, Ohio Oil Company; Joe T. Goodman-Gulf Refining Company; C. H. Lyons, Lyons & Prentiss; A. H. Tarver, independent; and A. H. Weyland, Arkansas-Louisiana Gas Company.

Sam S. Caldwell was elected executive vice president and secretary-treasurer, succeeding the late Arthur R. Campbell. Caldwell, who is completing his twelfth consecutive year as mayor of Shreveport, will assume his new duties November 16.

New directors were added as follows: George Wilson, Interstate Gas Company; E. G. Robinson, Shell Oil Company; W. F. Dalton, Hunt Oil Company; and Henry Walker, Arkansas-Louisiana Gas Company.

A resolution adopted recommends that Congress amend the Natural Gas Act by making it specific that it not apply to the producers of gas, but only to interstate shipment of gas.

Tighter Regulations on Intangible Development Expense Option Listed

Regulations covering the option on intangible development expense provided in Section 721 of the Internal Revenue Code have been sharply tightened by the Bureau of Internal Revenue.

Pointing out that cases have arisen in which drilling was done a number of years prior to the excess profits tax years and after a long period another well was drilled and the whole period from the initial development to the completion of such well was claimed as the development period, acting Commissioner William T. Sherwood has held that the time elapsing from the commencement of drilling to the completion of a well is undoubtedly to be included in the development period, but where such drilling is followed by a long period of production only, there is no sound reason for including such a period even though it is followed by a later drilling program.

"A lessee might have drilled a well in a shallow sand in 1935 and have believed that the property was fully developed until 1940 when a deeper sand was discovered by an adjoining operator," Sherwood said as an example. "As a result of this discovery, the lessee drilled a well to the deeper sand in 1940. In that case, it would be manifestly unreasonable to consider the intervening five years as a period of development."

Sherwood said the same principle would apply where a lessee drilled an initial well and then was short of funds or material for completion of his drilling program with respect to other wells.

"The development period should be measured by the actual time consumed from the initial steps taken in the location of the first well to the completion of that well, plus the similar periods consumed in drilling other wells, if any, on the same lease or tract," he ruled.

Sherwood held also that the cost of all geological and geophysical surveys "which have for their purpose the accumulation of knowledge on which to base action in the acquisition or retention of property" is capital in nature, but only that small portion of such surveys which have for their object the location of the exact spot on which to drill a well is recognized as part of the development cost of the lease and thus subject to the option and, further, that only the time consumed in a survey for the location of the well itself can be considered as part of the development period.

The ruling emphasized that while there has been some ambiguity in the use of the term "property," the word as used for excess profits tax purposes means a lease or individual tract. "There is nothing to indicate that any unit larger than a lease was contemplated by Congress," Sherwood commented.

Production in Louisiana During August New High

August crude production averaged 4,836,000 barrels daily, a drop of 86,000 barrels from the July record of 4,922,000 barrels, with all of the decline and more centered in the 88,000-barrel drop in Texas, the Bureau of Mines' monthly statement shows. Louisiana reached the 400,000-barrel mark for the first time in the history of its oil industry.

The drop in the face of increasing domestic demand, which jumped 22,000 barrels to 4,886,000 barrels daily, necessitated withdrawal of 50,000 barrels daily from crude stocks, which dropped during the month from a total, domestic and foreign, of 229,319,000 to 229,223,000 barrels.

Crude runs to stills continued at the July rate of 4,856,000 barrels daily, with a considerable part of the output going into stocks. Refined stocks increased 11 per cent during August as a result of the withdrawal of less than 600,000 barrels of finished gasoline against additions of 7,600,000 barrels of distillate fuel oil, 2,700,000 barrels of residual fuel oil and 3,100,000 barrels of kerosine stocks.

Total demand for motor fuel dropped from the July figure of 71,800,000 barrels to 70,600,000 barrels, and total demand for all oils dropped from 5,238,000 to 5,215,000 barrels daily. The yield of gasoline from crude rose from 39.8 to 41.2 percent, while that of distillate fuel oil declined from 16.3 to 15.7 percent.

Crude Production in United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED November 9	November 2
Alabama	1,000	1,000
Arkansas	73,450	73,350
California	868,600	870,200
Colorado	38,600	38,300
Florida	*	*
Illinois	206,900	210,250
Indiana	18,800	18,700
Kansas	267,450	279,100
Kentucky	30,250	30,400
Louisiana	399,850	394,350
North Louisiana	90,500	88,750
South Louisiana	309,350	305,600
Michigan	48,500	46,100
Mississippi	77,700	77,750
Missouri	100	100
Montana	23,500	24,250
Nebraska	750	750
New Mexico	101,000	99,600
New York	14,900	14,050
Ohio	8,400	8,100
Oklahoma	363,250	362,450
Pennsylvania	39,000	36,950
Tennessee	35	35
Texas	2,102,255	2,046,550
Tex. R. R. Comm. Districts:		
Dist. 1.—S. Central	18,985	19,450
Dist. 2.—Lwr. Gulf Coast	147,200	144,800
Dist. 3.—Upr. Gulf Coast	464,325	449,300
Dist. 4.—S. West	226,325	214,300
Dist. 5.—E. Central	36,835	40,000
Dist. 6.—E. Texas Field	324,000	316,000
Dist. 6—Rest of N. East	105,075	102,450
Dist. 7-B—W. Central	35,300	33,500
Dist. 7-C—West	29,510	27,450
Dist. 8.—West	512,750	484,700
Dist. 9.—N. Central	121,400	129,700
Dist. 10.—Panhandle	80,550	84,900
West Virginia	7,800	8,200
Wyoming	109,500	109,100
Total United States	4,801,590	4,749,635

* Wells shut-in.

Total stocks, foreign and domestic, November 2, as reported by the Bureau of Mines were 221,870,000.

Alec Crowell Appointed To Post in Washington

Alec M. Crowell, director of the Oil & Gas Engineering Committee of Mississippi, has been appointed to head up a new department of the Oil & Gas division of the Department of Commerce, to deal from the federal standpoint with problems of petroleum conservation and the provision of adequate national reserves. Crowell will take over his new duties December 1, and will be succeeded on the Mississippi Committee by John K. Wright, Jr., now chief engineer.

Alec Crowell

Crowell, a native of Monroe, N. C., has a background of 21 years' experience in petroleum. After various company connections he became, in 1933, chief natural gas engineer for the Oil & Gas Division of the Texas Railroad Commission. In 1938, when he left the Railroad Commission on loan to the Arkansas Oil & Gas Commission, he was director of field engineering and research.

In January, 1945, he was employed to organize the Mississippi Oil & Gas Engineering Committee. He is a member of API, AIMME, IPAA and Mid-Continent Oil & Gas Association.

Oil Companies Cooperate With Navy Training Plan

An industrial training program, calling for the assignment of ensigns just out of the Naval Academy to cooperating companies for a four to six months' course in actual industry has been announced.

So far, two oil companies, The Texas Company and Socony Vacuum Oil Company, have participated, each taking one officer, and other companies will cooperate in subsequent courses.

THE OIL MAN'S CALENDAR

NOV.	
11-14	**American Petroleum Institute, Annual Meeting, Chicago, Stevens Hotel.**
21-23	**Rocky Mountain Oil and Gas Association, Annual Meeting, Denver, Shirley-Savoy Hotel.**
22	**Independent Natural Gas Association. Annual Meeting, Fort Worth, Blackstone Hotel.**
DEC.	
4	**New Mexico Oil & Gas Association, Annual Meeting, Artesia.**
9-11	**Interstate Oil Compact Commission. Quarterly Meet, Dallas. Adolphus Hotel.**
16-18	**Annual Advalorem Tax Forum. Mid-Continent Oil & Gas Association, San Antonio, Plaza Hotel.**

Nomads Chapter monthly meetings: LOS ANGELES, second Wednesday, Mayfair Hotel. Houston, second Monday, Ye Olde College Inn. NEW YORK, first Monday, Louis Sherry's. TULSA, third Wednesday, Hotel Tulsa. DALLAS, date not yet fixed.

Hearings on Reciprocal Trade Pacts With 18 Nations Scheduled in April

The State Department will open negotiations next April on reciprocal trade agreements with 18 nations, including The Netherlands, the United Kingdom and Russia, in which reductions of tariff rates on gasoline, kerosine and naphtha; gas oil, residual fuel oil and unfinished oils; and lubricating oils, paraffin, petroleum jelly and petroleum asphalt will be considered.

American interests affected by the plans of the department are given until December 21 to file briefs with the committee for reciprocity information, which will open public hearings January 13, next.

The department said this is the largest reciprocal trade agreement negotiation yet undertaken and is designed to make effective the objectives for elimination of artificial trade barriers outlined in London at the preparatory meeting for the International Trade Organization conference to be held next year.

The department intends including in the proposed agreement an adequate escape clause, along the lines of that in the agreement with Mexico, under which a concession which, as a result of unforeseen circumstances, causes serious injury to domestic producers, can be modified or withdrawn.

The department did not state what it expected to receive in return for the lower tariff rate it is offering the 18 countries, but said it is preparing a "very extensive" list of requests and urged export interests to advise the committee for tariff reciprocity, at the hearings, what concessions they feel should be requested of the other countries.

Countries with which the new agreement will be negotiated include Australia, Belgium, Brazil, Canada, Chile, China, Cuba, Czechoslovakia, France, India, Lebanon, Luxembourg, The Netherlands, New Zealand, Norway, Union of South Africa, Russia and the United Kingdom, and the areas for which they have authority to negotiate.

West Edmond-Drumright Gas Pipe Line Put in Service

Cities Service Gas Company's new 64-mile 12-inch natural gas pipe line running from the West Edmond field to Drumright, Okla., was opened November 2. Gas is taken from the compressor station of Phillips Petroleum Company and Continental Oil Company in the old Edmond field, thus giving the Edmond district an outlet of 60 million feet of gas a day, all of which will go to the Kansas City, Mo., area.

The company will switch its old connection between Edmond and Drumright to the Oklahoma City system immediately, which will permit Cities Service to take an additional 20 million feet of gas daily from the Cement field into its 20-inch trunk line, from Oklahoma City to Wichita, Kas.

East Texas Reports

Detailed well status reports on all wells in the East Texas field are to be submitted to the Texas Railroad Commission by January 1, it was ordered last week. Failure of any operator to file this report will result in the severance of his pipe line connection.

Court Injunction Asked By East Texas Operators

A temporary injunction was granted by the 126th district court in Austin Friday to permit certain East Texas Gas operators, including The Chicago Corporation, to produce a quantity of gas equivalent to that allocated to unconnected wells in the field.

This was in the action taken by Clyde H. Alexander of Dallas, W. C. Feazel of Shreveport and The Chicago Corporation which sought to enjoin the Texas Railroad Commission from enforcing its ratable take order in the Carthage field, Panola County.

Approximately 30 of the more than 250 gas wells in the Carthage field have been shut in by the commission for exceeding allowables after the ratable take order was issued. The operators contended that the over-production was necessary to fulfill contract obligations. The petition cited possible damages in excess of $2 million—at the rate of $2000 a day.

Important Choice

(An Editorial)

THE most important office which Governor-elect Beauford Jester of Texas is called upon to fill is that of a successor to himself as railroad commisssioner. Jester has intimated this will be one of the first appointments he will announce. The future of the new governor's administration will be judged largely by this appointment.

There is a wide field of applicants, and a still wider field of possible choices, within the state. We hope, and believe, the governor will not make a purely political appointment for this office—that he will appoint someone who knows the oil business. He may be confronted with the fact that few successful oil producers or operators can afford to make the sacrifice of holding the office. We suggest that he may find in some of the allied fields, among independent petroleum engineers or geologists, just the man he seeks.

Texas Gas Reserves Gain Reported to Senate Group

Texas now has 880 gas fields and additional gas reserves have been found in 32 sands in the state during 1946, Jack Baumel, chief engineer for the Railroad Commission of Texas told the Texas Senate Gas Resources Investigation Committee last week. The committee which will make recommendations to the legislature in January recessed hearings until November 14 when industry representatives will testify.

Pointing out the commission does not have statistics upon which to base an estimate of total gas reserves in the state, Baumel said his personal estimate, based on 750 pounds working pressure, was 78 trillion cubic feet as of January 1, 1946. A different pressure factor would permit the estimate to be increased to 115 trillion cubic feet, he testified.

Expressing doubt that gas could be prorated to market demand on a statewide basis, as oil now is, Baumel said gas could be successfully prorated to the market for any single field.

Baumel said that under recent Texas Supreme Court decisions, the commission has all the power it needs to regulate the gas industry. Answering an inquiry by T. C. Chadick, committee chairman, regarding flared gas, Baumel said he thought Texas was about the only state keeping accurate records on flared gas and pointed out that to demand 100 percent conservation of casinghead gas would require many of the state's oil fields to shut down.

Albert Brown, auditor in the Comptroller's Department, said he saw nothing wrong with the present tax law, if adequate provisions are made in legislative appropriations for sufficient personnel to administer it. The present tax is 5.2 percent of market value at the well.

New USGS Map Shows Fields and Pipe Lines

A two-sheet map of the oil and gas fields and oil and gas pipe lines of the country has been published by the U. S. Geological Survey and made available at $1.50 for the set.

The map, on a scale of approximately one inch to 40 miles, shows oil and gas fields as developed to March 1, 1946, as well as all oil and gas pipe lines built previous to and during the war and up to that date.

Investigator Checking Bids

Herbert S. French, investigator for the House Surplus Property Committee will be in Houston this week to interview bidders for the Big Inch pipe lines perparatory to hearings which will be opened in Washington November 19.

Slaughter's trip is understood to have resulted from the refusal of War Assets Administration officials to furnish the committee with information regarding the financial set-up of the bidders for the line, on the ground that such information was confidential. The investigator conferred last week with bidders in Tulsa and Dallas.

Magnolia Announces 20-Inch Carrier From Corsicana, Texas to Patoka, Ill.

Magnolia Pipe Line Company is purchasing right-of-way for the construction of a 650-mile 20-inch crude carrier to extend from its trunk line terminal and tank farm near Corsicana, Texas, to Patoka, Ill., station, where it will intercept a relay line that serves eight refineries of the Socony-Vacuum Oil Company in the midwest and east. This project, which is the largest of the numerous postwar pipe line programs to be undertaken by a single company, was confirmed by J. L. Latimer, president of the Magnolia companies, and L. H. True, vice president of Magnolia Pipe Line Company, Dallas.

The 20-inch carrier will have an initial capacity of 104,000 barrels daily, using four mainline stations to be erected at Corsicana; Foreman, Southwestern Arkansas; Searcy, Ark., and Doniphan, near the south border of Missouri. The Mississippi River, only major stream along the route, will be crossed near Chester, Ill. Additional booster units at these stations can boost the capacity to 150,000 barrels daily.

Pipe, etc., is scheduled to start arriving early in 1947 with the carrier due to be in service within 14 months.

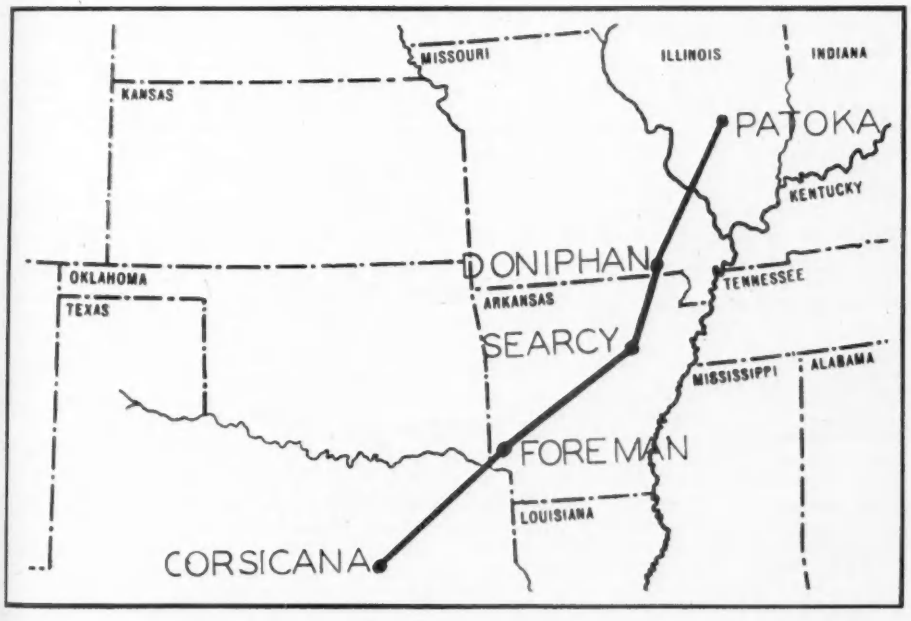
Each station will be equipped with three electric motor-powered centrifugal pumping units, with one unit on a standby basis. The line is designed to operate at 700 pounds pressure.

Telephone lines will parallel the carrier.

More than a million barrels of tankage will be installed including two 120,000-barrel tanks at Searcy station. Present tankage at Patoka will be augmented by nine 80,000-barrel tanks.

Corsicana terminal serves as the crossroads of Magnolia's network of trunk lines. It is on the company's multi-unit Oklahoma-Beaumont carrier, which can move oil south from Oklahoma and North Texas and north from Southwest Texas and Gulf Coast districts. The company's 12-inch that serves the East Texas field divides its stream at Corsicana, while an 8-inch sweet crude line and a 12-inch mixed-grades carrier, currently handling 23,000 barrels and 60,000 barrels daily, respectively, deliver oil into Corsicana from New Mexico, West and West Central Texas. The latter two units are destined to become an important contributor of oil traffic through the 20-inch due to the extensive crude reserves and undrilled proved locations in the Permian basin. Capacity of both can be materially increased by setting additional booster units.

The northern leg of Magnolia's system, involving 367 miles of 10-inch, rated at 45,000 barrels daily, between Wood River, Ill., and Lima, Ohio, was placed in service in August, 1939. It was built primarily to accommodate Magnolia's flush production and purchases from the Illinois basin, with this oil being routed west from Patoka to Wood River and east from Patoka to Lima for connection with other carriers that reach Socony-Vacuum Oil Company's refineries. Crude shipments from Corsicana will be routed east and west from the Patoka terminal. The decline of production in the Illinois basin has resulted in Magnolia filling the deficit by relaying Texas and Oklahoma oil from the Oklahoma end of its Mid-Continent system through other lines to Wood River and points north. This movement may be terminated when the Corsicana-Patoka 20-inch goes into service.



Route of Magnolia's New Crude Pipe Line

Various Gas Gathering Systems Being Worked Out

United Gas Pipe Line Company has made preliminary survey for construction of a natural gas gathering system in the Baxterville field, Lamar County, Mississippi, with a 12-mile 12-inch line extending west to connect with its present system. The company is said to have gas purchase contracts with Gulf Oil Corporation and other producers.

United Gas Pipe Line Company is constructing a gathering system in the Gwinville field, Mississippi, and is 40 percent complete on a 12-mile 12-inch line to tie into its present main line from Jackson to Mobile, Ala.

These two projects are part of a trade United Gas made with Gulf to purchase gas in the two Mississippi fields and in the Segno field, Polk County, Texas, and in the Hays field, south Louisiana. Gathering system will be installed in the latter fields in 1947.

Chicago Gas Hearing

Hearings will open in Chicago December 10 on applications filed with the Federal Power Commission by the Natural Gas Pipeline Company of America, Texoma Natural Gas Company and Chicago District Pipeline Company.

TGT Seeks to Loop Line

Tennessee Gas and Transmission Company has made application to the Federal Power Commission for permission to loop its Texas-West Virginia gas transmission line. The project calls for 832.2 miles of loop including 681.1 miles of 26-inch, 68.7 miles of 24-inch, and 82.4 miles of 20-inch line at an estimated cost of $59,545,000.

When the new project is authorized and completed, the company will be taking daily from Texas oil fields a total of 219 million cubic feet of previously flared gas. Already contracted for is 105 million cubic feet of flare gas, some of which is currently being transported and the remainder waiting gathering systems to various fields. The new project would increase this take of flare gas by 114 million cubic feet daily.

Tennessee Gas and Transmission Company's present line, Texas to West Virginia, is a 1265-mile, 24-inch line. If the loop is permitted to be constructed, the company will be able to transport a total of 600 million cubic feet of gas daily, 219 million cubic feet of which being previously flared gas. The company already has commitments for sale of the gas in the Appalachian region, officials declared.

In addition to the loop lines to be constructed, the application also calls for the erection of a new compressor station in Nueces County and the addition of another compressor in some 14 compressor stations on the existing line.

The company contemplates that the line will be partly completed by the end of 1947 if the application is approved.

Pemex Continues Hope for Big Oil Discoveries Despite Recent Failures

Among the more recent well completions in Mexico was Petroleos Mexicanos' Tepezintla 1, wildcat about 8 miles west of the Cerro Azul section of the Golden Lane, abandoned at 6217 feet after testing salt water. Casing used in the hole included 9⅝-inch cemented at 1965 and 5½-inch cemented at 5935 feet.

This was one of several wildcats drilled by Pemex along a trend to the west of the Golden Lane, others having been on the Tlacolula, Aragon, Soledad and Castillo prospects. The Soledad structure, about 10 miles west of Alamo, yielded some oil in a well completed in 1945, but a second well was unproductive. In the Castillo area, midway between Soledad and Poza Rica field, two wildcats were abandoned this year below 7000 feet, although showings were found in the formation equivalent to that producing at Poza Rica. The non-commercial oil at Soledad also was from the Tamabra, the pay at Poza Rica.

Despite these unsuccessful pioneering wells, geologists and geophysicists of Pemex have hopes that important fields, similar to Poza Rica or Golden Lane fields, await discovery. However, comparatively few wildcats have been drilled so far in search of such fields, and deep tests such as those heretofore drilled are expensive, usually entailing costly road building, laying of fuel lines, building of camps, etc.

Two wildcats currently are drilling in this same general area. Tlacolula 7 at mid-October was drilling shale at 4743 feet. It is about 15 miles west of the Potrero del Llano pool of the middle section of the Golden Lane. The Tlacolula prospect is roughly in line with the Aragon, Soledad, and Castillo prospects and the Poza Rica field, along a trend paralleling the Golden Lane to the west. The other currently drilling wildcat of the district is Pemex's Soledad 4, Guadalupe Hacienda, drilling below 3750 feet in a further attempt to prove the Soledad structure commercially important. Geophysics indicated a structural nose, but drilling has revealed structural details differing from those interpreted from the geophysical data.

The only other drilling in this region currently is at Poza Rica field, where 6 wells are drilling and derrick is up for another.

In the Panuco field, west of Tampico, two wells are being drilled on the southwest fringe of the heavy-oil production, both in the Hacienda Limon.

Three Wells in Northeast

In Northeastern Mexico, gas and distillate producing region just south of the Rio Grande, Pemex is drilling three wells. Las Norias 1, wildcat on a structure southwest of Mision field, is drilling shale at 5266 feet. Trevino 1, Municipios de Reynosa y Matamoros, state of Tamaulipas, was drilling in mid-October at 6651 feet. Mision 9, in the Mision field, was drilling at 1969 feet.

Ohio Mex Oil Corporation, only private company currently drilling in Mexico, is shut down at 625 feet (corrected depth) in Rancherias 9, in the Rancherias gas field, Camargo, Tamaulipas.

Besides the drilling discussed above, that currently under way in Mexico consists of wildcatting and field development in the Isthmus of Tehuantepec by Pemex. At El Plan field two wells are drilling, one is shut down, and two are derricks under construction. At Cuichapa field a new well has been spudded, following completion of two unproductive tests earlier this year. One of the Isthmus wildcats now drilling is Cabritos 1, down to 720 feet. The other is Sarlat 23, which had a serious blowout at 2454 feet in early September, resulting in heavy loss in pipe and equipment. This wildcat is on a faulted structure in the eastern part of the state of Tabasco.

Mud Formation Deep in Hole Halts Dominican Test

Dominican Seaboard Oil Company is preparing to abandon its Mella 1, wildcat near Barahona in southwestern Dominican Republic, at a depth of 8769 feet, this because of unusual conditions found which make it impossible to drill ahead below the present point. Experiment and research might be carried out to permit going deeper, but the company has decided against it since there have been no showings.

A protection string of 9⅝-inch casing had previously been cemented to 7002 feet, and the hole is open on down. After going through several streaks of salt, totaling 700 feet in thickness toward the bottom of the hole in Lower Miocene, operators drilled into an unstable formation at 8768 feet, apparently more of a mud than a heaving shale. After going a foot into it, the mud started coming up into the hole and mud weights of 13½ to 15½ pounds failed to hold it in place. The walls of the hole above that point do not collapse, but it is simply a flow of the muddy substance which will rise as much as 400 to 450 feet into the hole. With the heavy column of 15½-pound drilling mud in the hole, and with blowout preventers closed, it will build up a pressure of as high as 1700 pounds before it is stopped. It can be cleaned out rather easily to within about 50 feet of the bottom and at about that point it starts back up in the hole again. It will actually support up to 60,000 pounds of the weight of the drill pipe as it is rising in the hole. The pressure it exerts seems to be hydrostatic since there is no gas in it, and the operators have calculated that the bottom-hole pressure is something like 8500 to 9000 pounds, or about equal to virgin rock pressure for this depth.

Location of this test is in the southwestern part of the Republic, northwest of the town of Barahona.

Argentina's Production For Six Months Declines

Crude oil output in Argentina during the first half of 1946 showed a slight decline as compared with production during the same period in 1945. The decline was noted primarily in the state-owned fields operated by Yacimientos Petroliferos Fiscales (Government Oil Fields). This reduction in output is reported due mainly to the shortage of drilling equipment.

During the first six months of 1946 the state-owned fields produced 1,114,152 cubic meters (6,996,875 barrels) as compared with 1,238,839 cubic meters (7,779,909 barrels) during the same period in 1945. Privately-owned wells produced 529,380 cubic meters (3,324,506 barrels) as against 600,563 cubic meters (3,771,536 barrels) in the first six months of 1945. Total production for the first six months of 1946 was 1,643,532 cubic meters (10,321,381 barrels) as compared with 1,839,402 cubic meters (11,551,445 barrels) in the like period of 1945.

Kuwait Company Drilling No. 10 as Exploratory Test

Kuwait Oil Company has started a well in the Burghan field, Kuwait, the first since the beginning of World War II, and is drilling in surface formations. Previously this No. 10 had been started as a wildcat 10 miles north of the Burghan field, but war forced suspension of drilling and it has now been designated as an exploratory well and the consecutive numbering of field wells continued.

Currently the field is producing at the rate of 40,000 barrels daily, although the potential is far above that. Production is largely from eight wells, although the ninth well is flowing, but is being used for testing purposes.

Kuwait Oil Company, Ltd., is owned jointly by Gulf Oil Corporation and Anglo-Iranian Oil Company.

Australia Activities

Freney Oil Company's wildcat test in the Kimberley District, Northwest Australia, is reported at 4271 feet and is within a few hundred feet of its objective depth.

The Freney Company holds about 550 square miles in the area while Caltex Company has more than 110,000 square miles surrounding the Freney block. The Caltex firm now is reported to have two geophysical parties working acreage.

British Imports

Imports of petroleum and products by Great Britain during the first nine months of 1946 totaled 2,940,545,000 gallons, an increase of about 22 percent over the same period in 1938. However, the imports were somewhat lower than during the first nine months of 1945.

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Part 4

Wells in Thermal Equilibrium

By HUBERT GUYOD
Well Logging Consultant, Houston

Temperature

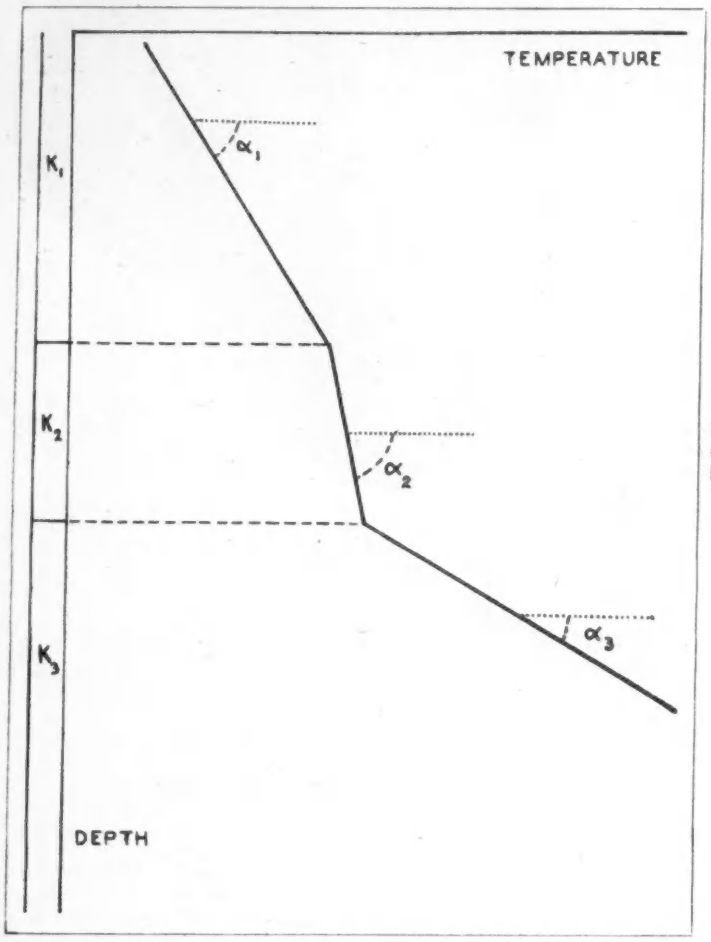


Figure 4-1. Logging of horizontal beds having different heat conductivity.

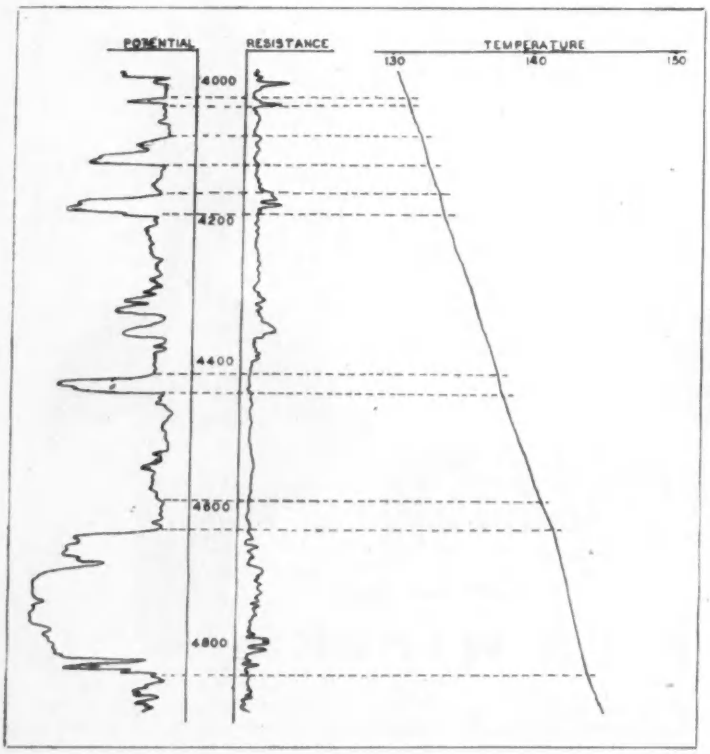


Figure 4-2. Electric log and temperature log in a well in thermal equilibrium (Dickinson field, Texas.)
Courtesy Humble Oil & Refining Company.

AS FAR as temperature logging is concerned wells can be classified into the two following groups:

1. Wells which are in thermal equilibrium. The temperature in such wells will be termed "static."
2. Wells which are not in thermal equilibrium. The temperature in these wells will be termed "transitional."

Only wells of the first group will be considered in the present article. These comprise primarily:

a. Cable tool wells at almost any stage of the drilling period,
b. Rotary holes which have been idle for a few months,
c. Producing wells which have been shut down for an appreciable time (several months).

The type of well considered is immaterial because, when the fluids situated in the hole are in thermal equilibrium with the adjacent formation, the temperature in the hole is dependent almost exclusively upon the temperature of the ground.

Effect of Casing Negligible

Since many of the wells in which temperature measurements are taken are cased, it is advisable to investigate to what extent the casing modifies the temperature of the ground.

The heat conductivity of steel is much greater than that of sediments and other rocks. A conventional steel casing will therefore modify locally the temperature distribution of the ground. A simple calculation shows that the effect of a casing of average size containing water or mud is the same as that of a uniform cylinder whose diameter is equal to the casing diameter and whose heat conductivity is of the order of 30×10^{-3} C.G.S., namely about ten times as high as the average conductivity of sediments.

Measurements conducted on a scale model have shown that the presence of such a cylinder does not modify the ground temperature, except perhaps very close to the pipe (at a distance less than 20 feet) where no definite data could be secured because of the smallness of the model ($1'' = 400'$). Data are also lacking on the temperature of the fluid inside the casing. However, it is probable that the temperature of this fluid is modified qualitatively as follows:

In the bottom half of the casing the temperature is somewhat less than normal. Near the top of the casing, the temperature is slightly greater than normal.

The foregoing statements are based on the fact that, basically, a casing is similar to a very conductive salt dome turned upside down. Therefore, the isogeothermal pattern inside a casing must be, in some respects, similar to the pattern obtained in a salt plug (see Part 2 of this series). How much the presence of the casing modifies the temperature of the fluid situated inside is not known

WELL LOGGING

BECAUSE the heat conductivity of sediments varies from bed to bed, there is a geothermal gradient change at each formation boundary. Temperature measurements made in wells which are reasonably in thermal equilibrium can be used for logging formations, even if the well is cased.

but it is presumed that the resulting temperature anomaly must be very small.

Regardless of the magnitude of this anomaly, it is certain that the general trend of a depth-temperature graph taken in a casing is qualitatively identical to that of a graph obtained far from it. In particular, the two graphs exhibit breaks, or other gradient changes, at exactly the same geologic levels.

Similar remarks can be made regarding the effect of cement, mud invasion, etc., behind the pipe. The influence of these factors is very small and most likely negligible.

Typical Temperature Logs

From the foregoing discussion it is evident that the influence of the casing may be disregarded unless, perhaps, extremely accurate absolute temperature measurements are required. Such accuracy is not necessary for logging purposes.

It has been explained (Part 1 of the series) that, in horizontal sediments and far from intrusions, the depth-temperature graph consists of straight sections whose slopes vary from bed to bed. If α designates the angle of slope (Figure 4-1) then

$$\tan \alpha = CK$$

where K is the heat conductivity of the bed, and C a constant whose value depends upon the scales of the graph.

The slope of a temperature graph is greater for good heat conductors than for poor conductors. Since the heat conductivity of the ground varies from bed to bed, a temperature log made in a well which is in thermal equilibrium exhibits breaks at the level of each boundary. This is illustrated on Figure 4-2 which represents the temperature log of a well near the Dickinson oil field (Galveston County, Texas). By comparing this record to the potential graph of the electrical log plotted to the left, it can be seen that the slope of the graph is significantly greater in sands than in shales. However, where the beds are thin (less than about five feet) the change in slope usually cannot be seen because the logging speed was too great (about two feet per second). If this graph had been recorded for the particular purpose of logging the formations traversed by the well, there is no doubt it would have shown a change of slope for each bed more than about two feet thick. When it is remembered that the temperature distribution in the ground obeys Fourier's law, it cannot be doubted that the temperature gradient breaks sharply at each formation boundary, even when the thickness of the beds involved is only a fraction of an inch.

This sudden change in temperature gradient from bed to bed is different from the smooth changes obtained in

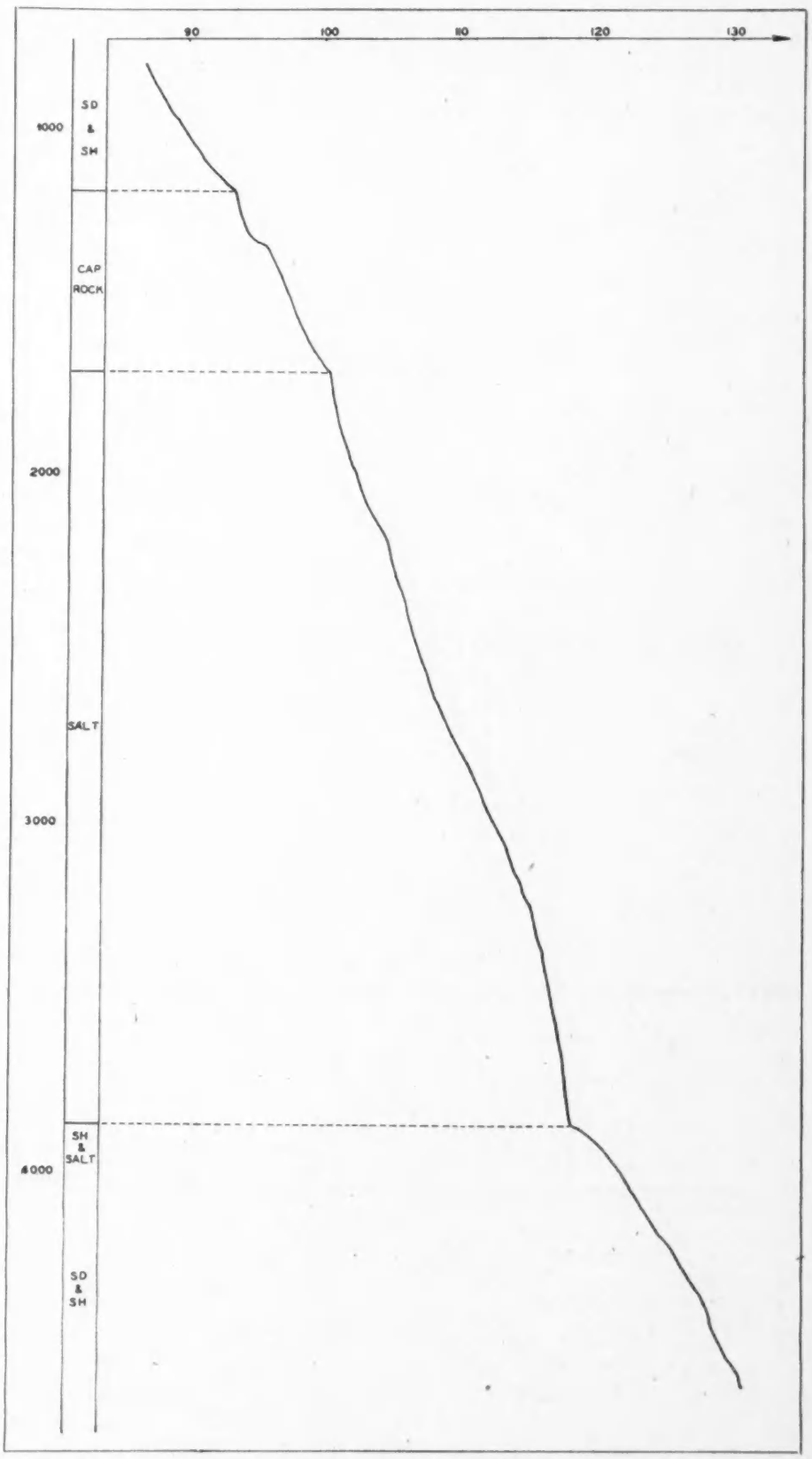


Figure 4-3. Temperature graph obtained in a Gulf Coast well having penetrated a salt overhang.

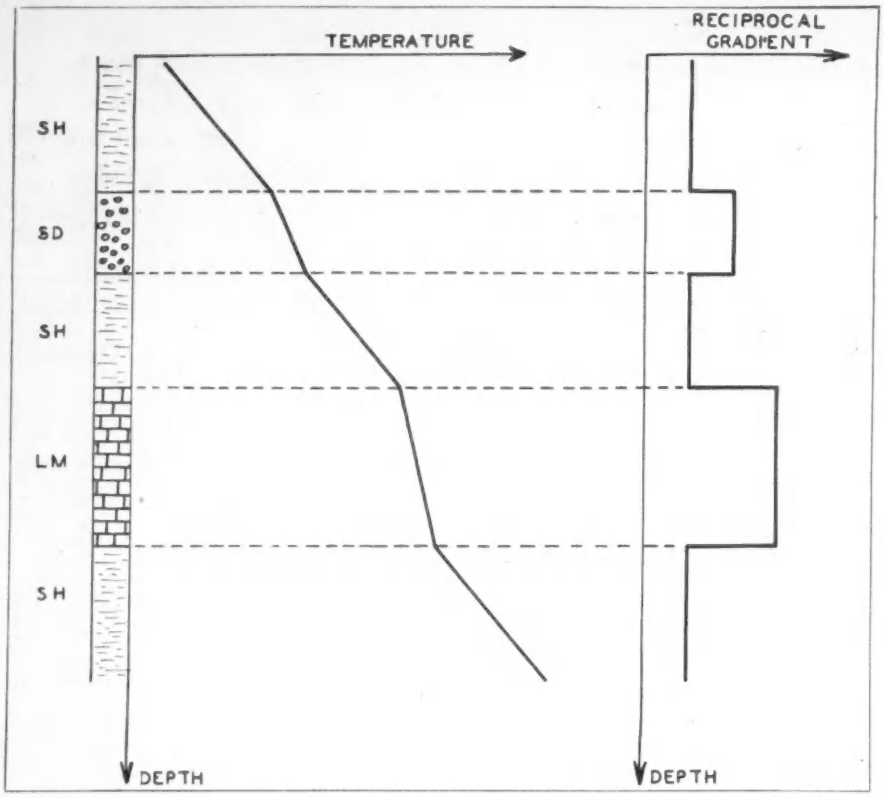


Figure 4-4. Temperature graph and corresponding reciprocal-gradient graph.

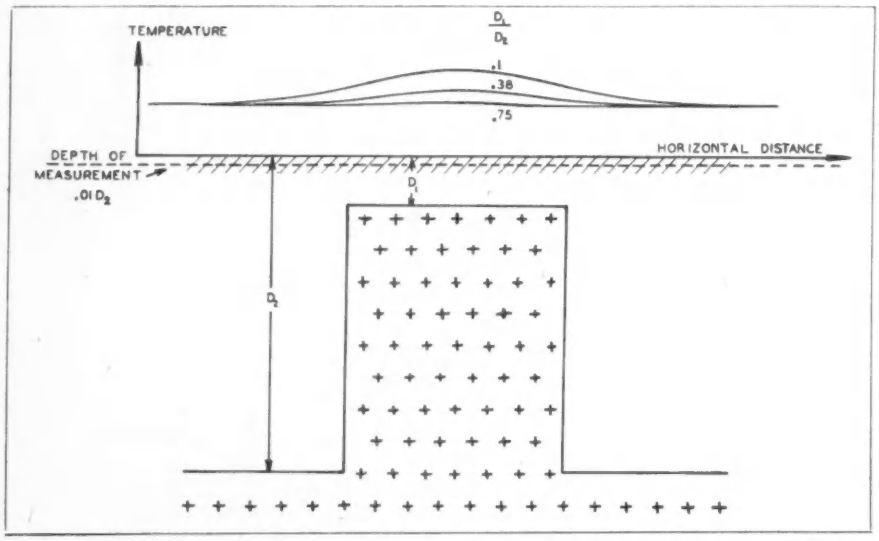


Figure 4-5. Horizontal temperature changes above salt domes of various depths (scale model data).

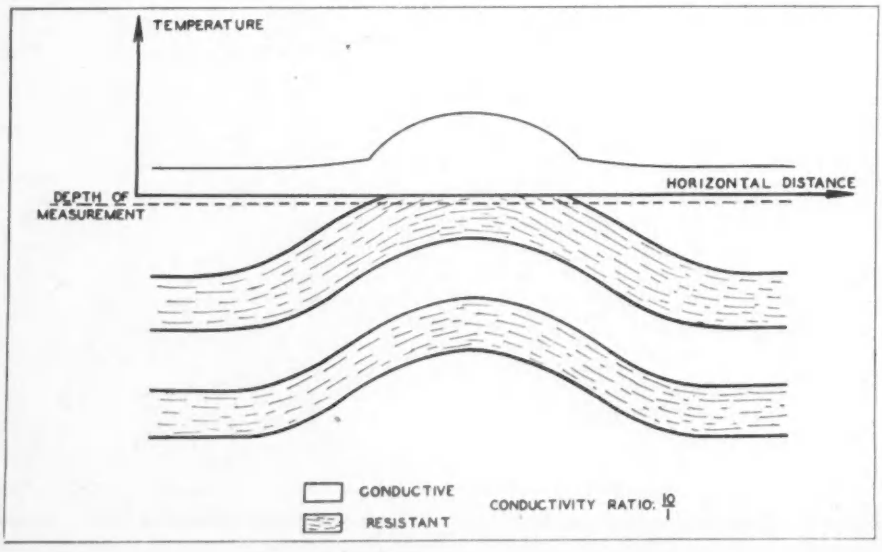


Figure 4-6. Horizontal temperature changes near an anticline comprising heat-resistant beds (scale model data).

electrical logging. The difference is due to the two following facts:

1. The heat flow pattern in the ground is entirely different from the electric flow pattern artificially produced for resistivity logging.
2. Resistivity measurements are averaged on several feet (the distance between pickup electrodes) while temperature measurements are taken at one point (more exactly, they are averaged over the length of the thermometer which is always small: usually a few inches).

Figure 4-3 is a temperature log obtained in a Gulf Coast well having penetrated a salt overhang. The top of the cap rock and the bottom of the salt are sharply indicated by changes in slope. The anomaly at 1300-1350 corresponds to cavities reported by the driller (causing perhaps some circulation of water although the well was cased at the time the measurements were taken). The numerous slope changes found in the salt section are due to a lack of uniformity within the salt. This is possibly caused by impurities and/or by the anisotropy created by folding.

Gradient Graph

A shortcoming of depth-temperature graphs is that the breaks, i.e. the formation boundaries, are difficult to pick from the log. A graph showing a discontinuity at each boundary would be more readily interpretable. This can be obtained by plotting the temperature gradient, or its reciprocal, in terms of depth instead of the temperature itself. For example, if the section being logged comprises sands, shales and a dense lime, the reciprocal gradient log would be as shown to the right of Figure 4-4. It is obvious that this graph is more readily interpretable than the equivalent temperature graph.

It has been explained that, in horizontal formations, the heat conductivity and the reciprocal gradient are proportional. Therefore, the graph to the right of Figure 4-4, if properly calibrated, is a conductivity log. Since the heat conductivity varies from one type of sediment to another, it is obvious that this graph not only can log formation changes, but it can even help identify many formations when enough local data are available.

If the sediments are not horizontal, or if the measurements are taken near intrusions or ridges, the reciprocal gradient graph does not give correct conductivity values. The "apparent conductivity" data thus obtained are nevertheless readily interpretable in almost every instance because the relative conductivity values are not appreciably modified.

Application

To summarize, continuous temperature measurements when properly made can be used to log wells, even cased ones. A temperature log, however, is

not as versatile as an electric log and it is probable that it will not generally supplant the latter in open holes. Its main shortcomings are as follows:

1. It is probably of no value for detecting petroleum directly.
2. It does not permit formation identification as well as a multiple-curve electric log.

On the other hand, a temperature graph is extremely useful to log cased holes especially when the formation consists of relatively thick beds, or for correlation purposes. However, it will probably never give a record as detailed as that given by radioactivity measurements.

In short, temperature measurements can be used successfully for the logging of many cased holes, in particular when extreme detail is not imperative, or when radioactivity measurements are not available or when their price is prohibitive.

Shape of Temperature Graphs

It is difficult to predict the shape which a depth-temperature graph will have unless the nature of the formation considered is reasonably well known. When this information is available, it is not too difficult to estimate the general trend of the graph and conversely, from the trend of a temperature graph it is sometimes possible to draw a few conclusions regarding the nature of the formations either actually traversed, or situated nearby. For example, if the general direction of the graph is a straight line it can be assumed that the well is far from any dome or anticlinal ridge. If the graph is convex toward the temperature axis it is probable that the well is bottomed above a salt or igneous intrusion. Finally, if the graph is concave toward the temperature axis it is likely that the well was drilled near a conductive intrusion, or that the actual heat conductivity increases with depth. Such an increase is usually caused by the gradual compaction increase with depth observed in most sediments. (The heat conductivity increases slowly with temperature, i.e. with depth. This effect is very small and is generally dominated by the influence of the other factors.)

To summarize, a depth-temperature graph may have almost any shape and it is therefore dangerous to extrapolate it in order to estimate the temperature existing at relatively great depths, unless the nature of the formations in the area involved is reasonably well known.

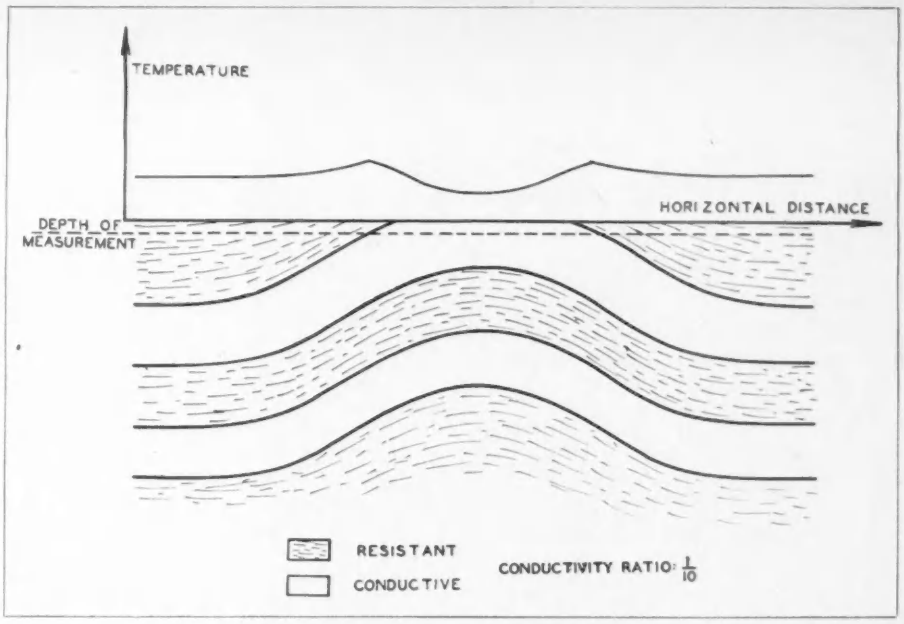


Figure 4-7. Horizontal temperature changes near an anticline comprising heat-conductive beds (scale model data).

Exploration

In the two preceding articles it has been seen that salt domes, anticlines, etc., modify the temperature distribution of sediments in every direction over large distances, and in particular near the surface of the ground. Therefore at any depth, even small, the temperature varies in a significant manner over structures, and the data can be used for exploration purposes. Because of its simplicity the method has been applied for years, in particular in petroliferous provinces.

The general method of interpretation used at present seems to be that anticlinal structures produce temperature highs, and conversely. It has been seen (part 3 of the series) that this is not generally correct and that certain types of anticlines produce a temperature low near the surface, while certain synclines result in a temperature high. In other words, a correct interpretation of the data is more elaborate than is usually realized.

Figures 4-5, 4-6 and 4-7 are typical horizontal temperature profiles obtained above various types of structures. These data are given only to illustrate the foregoing comments and should not be used quantitatively. Figure 4-5 gives data for salt domes whose relative depths are 1, .75 and .38, respectively. Figures 4-6 and 4-7 refer to anticlines.

A more elaborate discussion of the problem will be given at a later date when all the necessary information is assembled.

Location of Ore Deposits

Because of their high heat conductivity, many ore deposits modify appreciably the temperature distribution in the ground (see Part 3 of this series). If an exploratory well fails to penetrate the deposit but passes close by, there is a good possibility that a temperature graph will exhibit a significant anomaly permitting to determine the depth of the mineral. The more uniform the surrounding formation, the greater the resolving power of the method.

If the ore oxydizes in the ground, the heat evolved by chemical reaction further modifies the temperature distribution and the location of the mineral is appreciably facilitated. Graph A of Figure 4-8 is an hypothetical depth-temperature graph obtained in a well drilled near an ore deposit of high conductivity (10 times greater than that of the surrounding formation). Graph B is the graph which would be obtained if the same ore generates enough heat to raise its temperature about ten degrees.

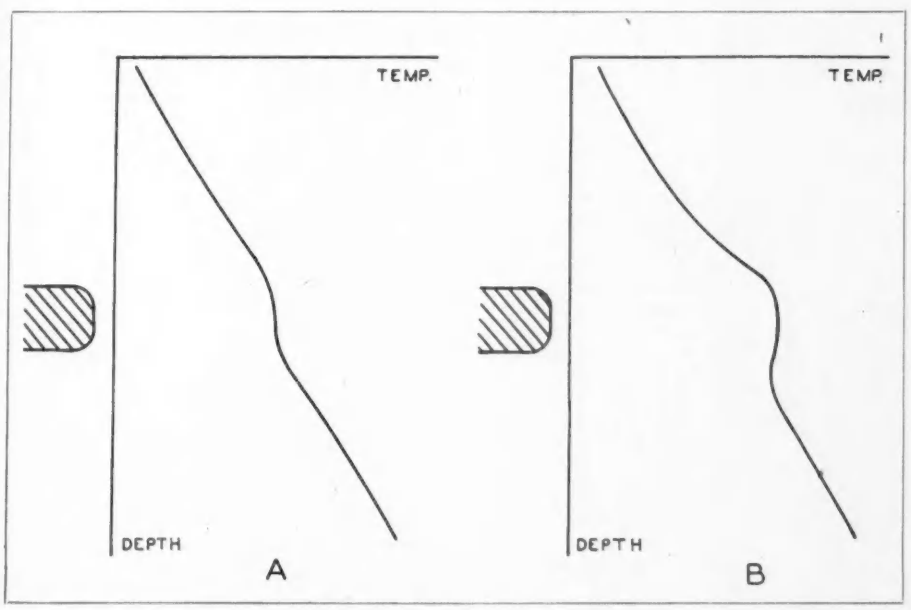
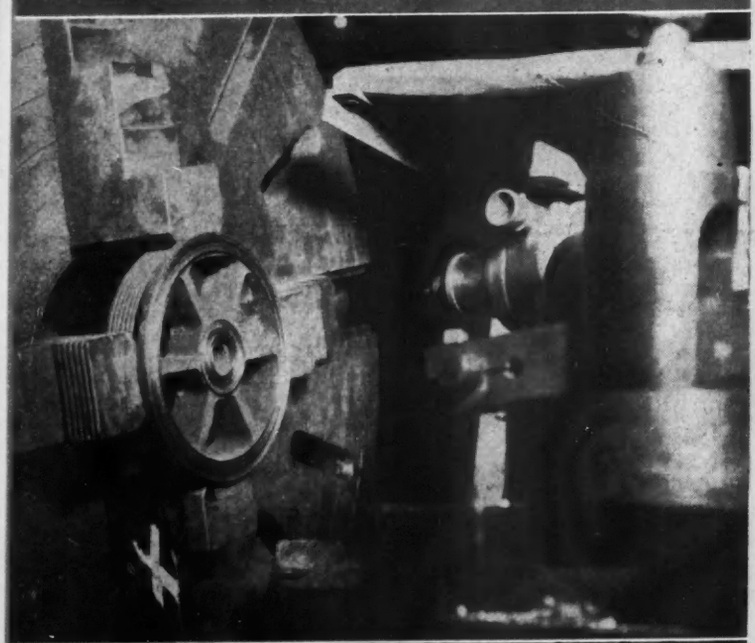


Figure 4-8. Depth-temperature graphs in the vicinity of an ore deposit.

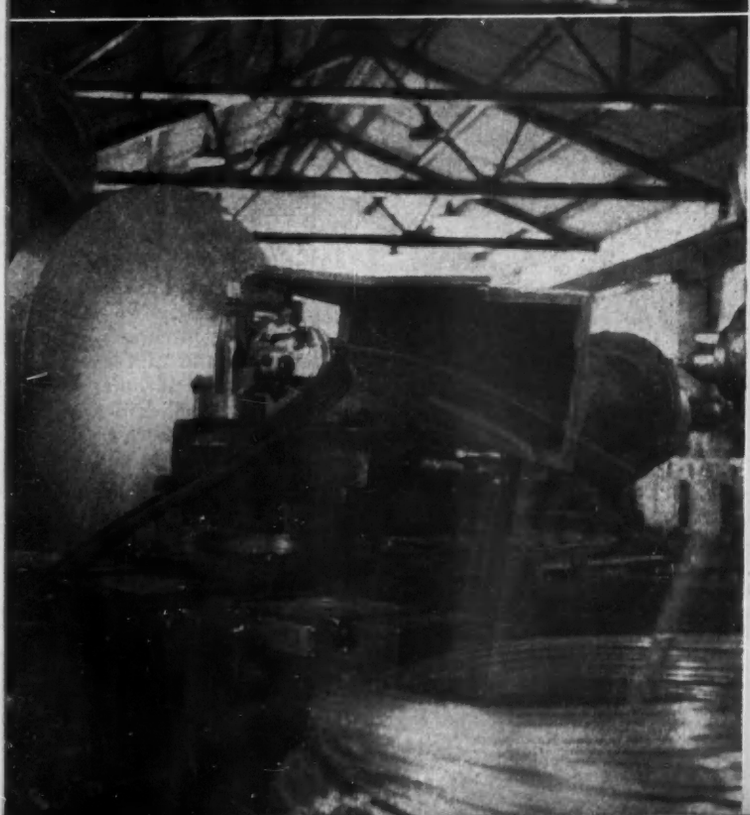
Fourth of a series of seven articles based on research work sponsored by Halliburton Oil Well Cementing Company. Previous parts have appeared in THE OIL WEEKLY of October 21 and 28 and November 4.

Hard-Faced Valve Seats Extend Pump Life

By ELTON STERRETT, Engineer



Valve spider after careful centering in lathe chuck and removal of metal to form two grooves, each 3/32-inch in depth, across former wearing or contact areas of unit. The shoulders left to retain the sprayed alloy are plainly visible, as is also the serrated, rough bottom of the turned area.



Metallizing head or spray gun mounted alongside tool post, with coil of ⅛ inch, 18-8 high carbon alloy wire feeding from reel mounted just beyond the lathe vees. Exhaust fan sets up strong suction current into hood at right, removing fumes and metallic dust from the working area and safeguarding operator's health.

ON MOST oilfield and pipe line equipment, where normal operation is on the basis of 24-hour, seven-day service, the dollar cost of repairs or replacement is negligible; but the monetary loss sustained through prolonged down time, through lost production or deliveries, can mount quickly into totals which seriously affect the profitableness of the plant or lease.

Such relatively small items as valve seats for reciprocating pumps handling products or serving to circulate cooling water through internal-combustion power units, are relatively inexpensive, but their replacement involves the shutdown of the entire unit to which the pump is connected, unless the layout is equipped with dual units so as to permit the servicing of one while the other maintains the cycle of operations.

One of the operating divisions of The Pure Oil Company has worked out a method for reconditoning worn valve seat spiders and replacing the wearing surface with hard-facing material to take the pound of the valve. Through adoption of this revamping of pump design, the effective service life of the spider has been extended from the former three or four-month replacement schedule to an average working life of a like number of years—extending the interval between replacement shutdowns 12 times.

After the initial service run of the seat as furnished in the pump, the spider is pulled in the usual manner and accurately spotted in the chuck of a lathe used solely for metallizing operations. Centered and aligned so that the wearing surface of the spider is concentric with the lathe spindle and with the outer surface perpendicular to the plane of tool travel, metal is removed to form a groove overlapping the area of wear in both directions. This groove or recess is formed with a special tool, set slightly above the center line of the lathe spindle, and with negative rake—that is, with the top face of the cutting edge sloping toward the work instead of away from it. This combination of tool grind and setup tears out the metal from the spider, instead of removing it smoothly in long shavings. The resultant cut is serrated, so as to afford maximum holding surface for the applied hard-facing material.

All metal to be removed from the seat is taken out in a single pass of the tool, the undercut being approximately 3/32 of an inch in depth. Especial care is taken to preserve the shoulders of metal in the valve seat at the edges of the recess. The same operation is performed on the hub of the seat, as seal must be perfect at this point also to guard against leakage.

Beginning the Cut

Prior to beginning the cut, the tool is checked to be sure that it carries no oil or grease; the disk or spider to be refaced is cleaned thoroughly, and the operator is careful not to touch the newly formed recess with finger or work glove—so as to insure perfect metal-to-metal contact as the hard-facing material is sprayed into place.

As quickly as possible after the grooving operation is completed, the metallizing head is mounted in the tool post, and ⅛-inch wire, of 18-8 high carbon alloy, is sprayed into the recess. The lathe is run at the same speed as that employed during the turning operation,

but the traverse of the metallizing head is slowed to approximately half the feed of the tool. The hub is first built up, so as to project above the upturned portion of the disk at least 1/32 of an inch. The head is then shifted to a position where it will play across the seating groove, and this area likewise brought up above the surface of the remainder of the part being refaced. It has been found that the wedging effect of the sprayed metal in the two recesses is better if both are filled from the inside—toward the center of rotation—outward to the limit of the space to be sprayed.

Without shifting the location of the sprayed spider in the chuck, a specially-formed finishing point is put in the tool holder, and the excess metal carefully shaved away until the former surface of the spider is reached, as shown by the hair line groove of demarcation between parent and sprayed metals. Since it is necessary only to insure that the hub and seating ring lie in the same plane and are of the required degree of smoothness, no effort is made to bring the sprayed material down to the level of non-contacting portions of the spider. Due to the extreme hardness of the sprayed metal, the tool feed across the face of the work is much slower than that used for roughing out the recesses. With the same speed on the lathe spindle as for the first operation, the tool cross feed is less than one-quarter that of the first turning.

Finish Cut

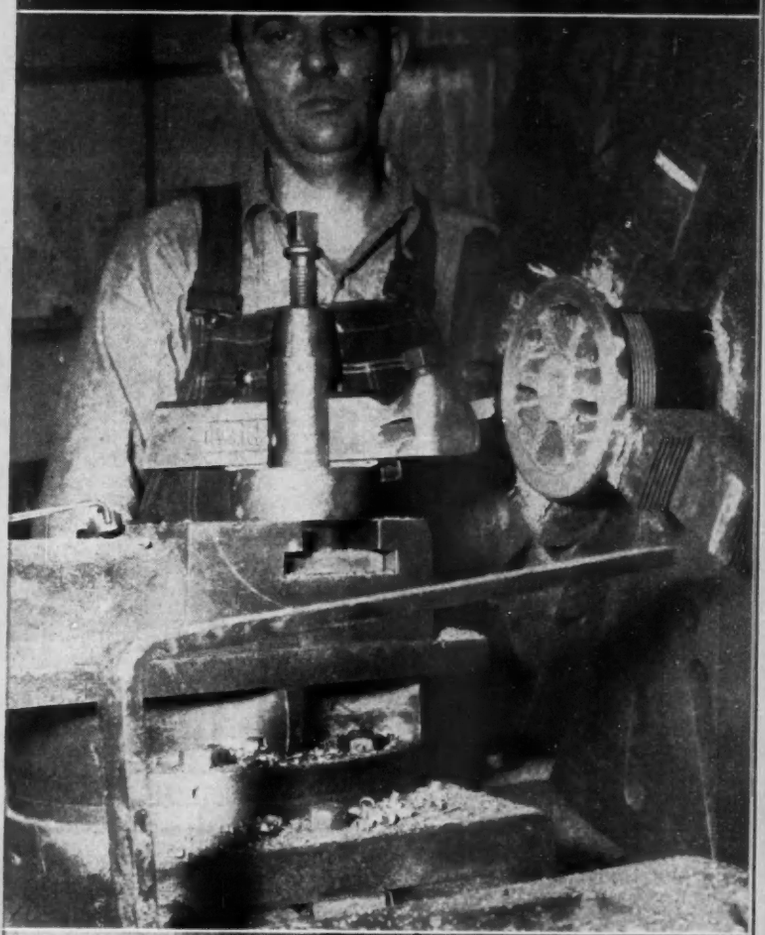
The finish cut does not leave the contact surface absolutely smooth, due to the hardness of the metal to be removed, but the peening action of the seat on the spider during operation soon forms a surface which is bright and which maintains sealing efficiency over long periods of use.

Before adopting this method of refacing worn valve seats, The Pure Oil Company tested metallized seats and disks thoroughly in service. At various service intervals metallized parts were removed and tested to destruction. Seats, sawed in two across the diameter, showed that the metallized or sprayed material, firmly affixed to the serrated surface of the parent metal, had apparently been peened tightly into the shoulders of the groove, and absolutely no penetration of liquid was to be noted along the line separating the two metals.

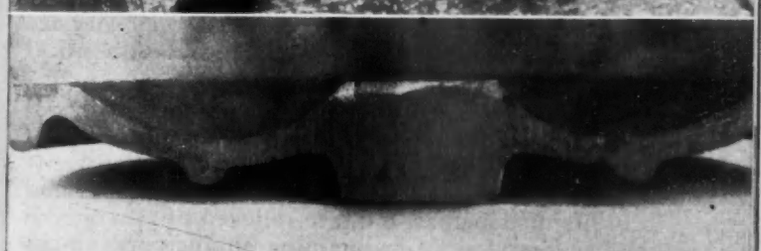
Attempts to separate the 18-8 high carbon filler metal from that of the seat by driving a ½-inch cold chisel into the material failed to tear out the junction of the two in advance of the cutting edge of the chisel. The tool cut through the original seat metal, shearing the serrations left by the original turning operation used to form the groove, but the seat metal imbedded in the filler remained tightly held, even after the shock and jar of hammering on the chisel.

In the original service refaced valves and seats are working in fluids at temperatures up to 400° F., and under pressures ranging from vacuum to 400 pounds per square inch. Corrosion, where both seats and valves are refaced with 18-8 high carbon is reduced to a minimum, as the special alloy numbers corrosion resistance among its other advantages, and such corrosion as occurs is now outside the contacting and sealing surfaces, and thus does not impair the working efficiency of the pump.

The valve spider at the completion of the spraying operation. The grooves have been filled with hard-facing alloy, which is now 1/32nd of an inch above the former surface of the seat before the beginning of the reconditioning operation. The sprayed metal, covering the entire surface, adheres only on clean surfaces and is easily removed elsewhere.



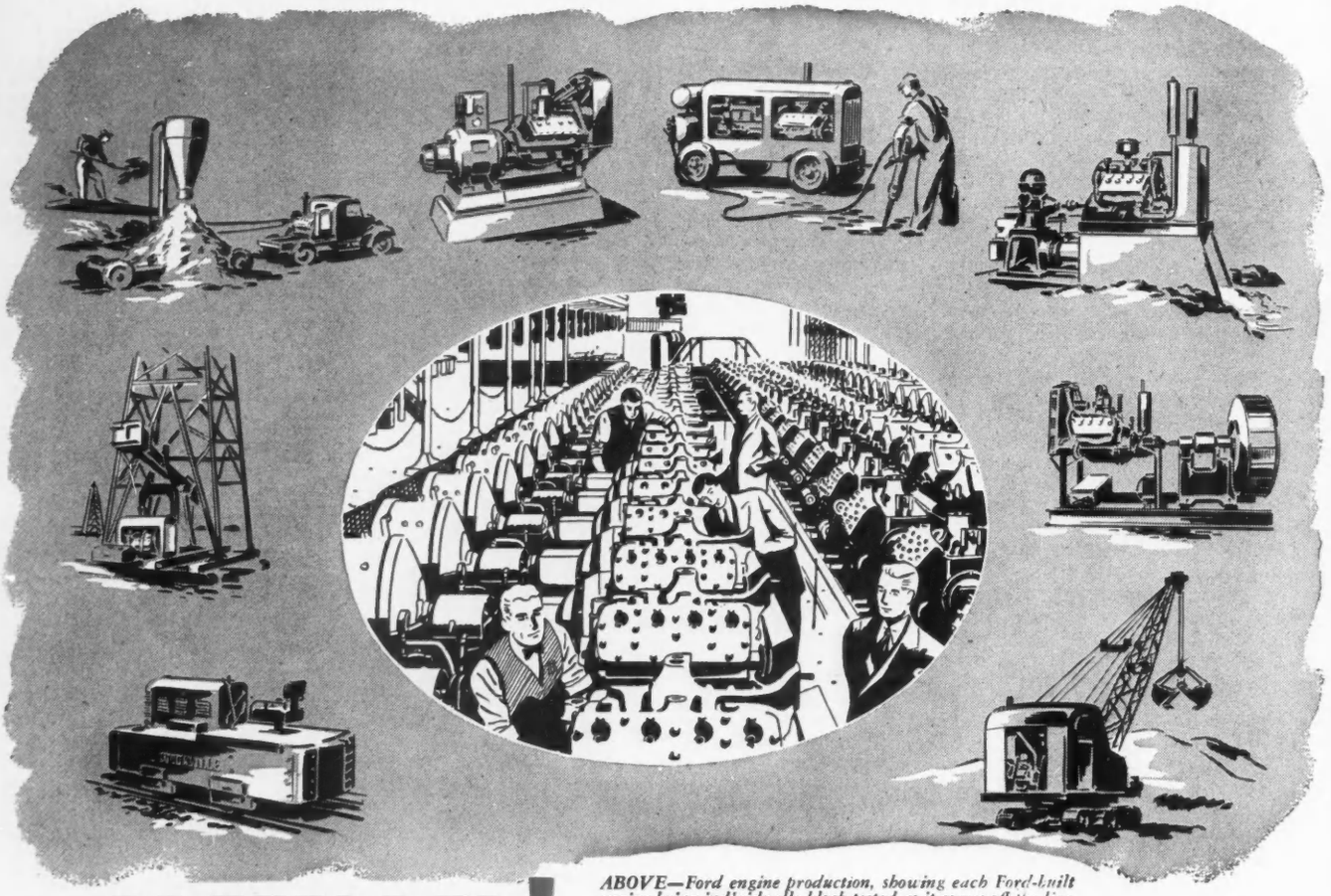
The hard-faced valve seat after the finishing operation. The light circles on the face of the unit show the limits of the grooves turned out to accommodate the sprayed metal. The two metallized surfaces are finished in the same plane, but the remainder of the unit is untouched by the tool, as no seal is desired other than on the built-up areas.



Cross section of a valve which has been hard-faced with 18-8 high carbon alloy by the metallizing process. The extent of the added metal is clearly evident, especially at the right of the view, as are the serrations of the groove which add to the effectiveness of the metallic bond between valve body and sprayed metal.

Setup of a lathe for reconditioning valves, with exhaust hood for fume and dust removal, the back panel of the hood being removable for working on rods and shafts, and removed, in this instance, to afford view of the work in the chuck of the lathe head.

FORD-BUILT ENGINES



ABOVE—Ford engine production, showing each Ford-built engine being individually block-tested as it comes off the line.

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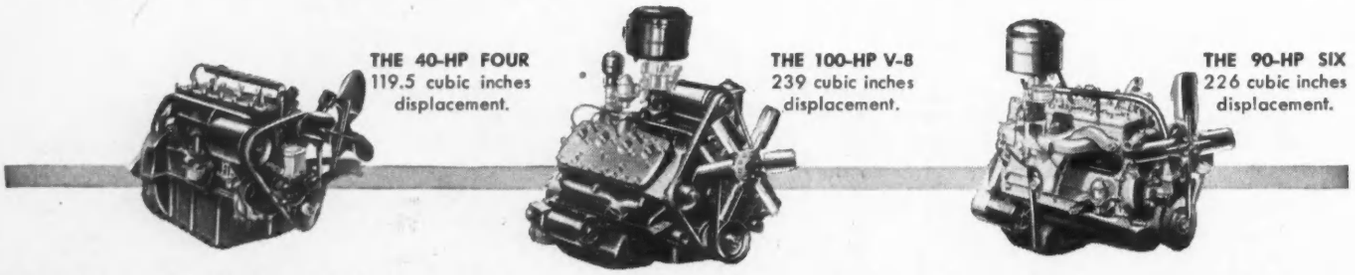


THE 40-HP FOUR
119.5 cubic inches displacement.

THE 100-HP V-8
239 cubic inches displacement.

THE 90-HP SIX
226 cubic inches displacement.

FOR INDUSTRIAL AND MARINE POWER

SALT
Quickly Cleans Flow Lines

By L. N. SCHEUERMANN,
Paracut Oil Development Co., Inc., Corpus Christi, Texas

AN EFFICIENT and inexpensive method of removing hydrocarbon deposits from oil well flow lines is by using salt of the variety commonly known as "ice cream salt." Introduced into the flow line as an abrasive, the salt acts as thousands of miniature knives, cutting and chipping the hydrocarbon deposit until it is completely removed from the line. Even though the patented process covers all types of abrasives, salt has been found, through actual experience, to be far superior to other abrasives that might be used in the process.

This inexpensive abrasive has been used about 2000 times over a period of several years in tests covering all types of hydrocarbon deposits. The time involved is short; for instance, one 16,400-foot line was cleaned recently in about 30 minutes. One man can easily clean lines, which means labor saving.

Insoluble in oil and readily soluble in water, salt is introduced as a mechanical abradant in entrainment with the oil in the line where it acquires sufficient momentum to cut the paraffin in a mechanical manner. The minimum flow pressure is about 130 pounds per square inch. If the pressure is less, it can be built up by taking pressure from another well or by using a pump.

No Packups

One advantage of using salt is that if any accumulation results from combinations of the paraffin and abrasive, the abrasive can be dissolved out by circulating water through the flow lines to release the packup. However, in over 2000 tests, no packup has occurred. Salt has the following properties which are necessary to remove hydrocarbon deposits:

1. Crystalline form and not too fine,
2. Sufficient hardness,
3. Insolubility in petroleum oil,
4. Solubility in water,
5. Non-poisonous,
6. The general properties of not reacting with oil or water,
7. Non-injurious to equipment or personnel.

Injecting Salt

To dislodge paraffin accumulations, salt is introduced in large quantities at the upstream end of the flow line. Salt contains jagged crystals, sharp and irregular edges, which enhance the cutting effect. Crystals of this character possess substantial weight and size. By reason of their weight, they acquire substantial momentum when entrained in the rapidly-moving oil stream to collide with the deposit with considerable velocity, thus bringing about attrition and the undesirable deposit is reduced and finally removed. Salt forms a flexible, abrasive plug when passing through the line and is not affected by encountering elbows or other bends and curves necessary in most flow lines.

Above: **Deposit of hydrocarbon in oil flow line.** ***Below:*** **The same flow line after salt had removed the hydrocarbon deposit. Time involved, 30 minutes.**

The type of deposit, hardness, volume of deposition and other factors depend upon the oil base, paraffin or asphalt, temperature, size of pipe, pressure, etc. Salt cuts the undesirable deposits into very small particles, which are carried off with the flowing oil. The abrasive being insoluble in oil, retains its crystalline form.

Practical examples in using salt for cleaning oil flow lines follow:

Example 1—In cleaning oil lines, gathering lines, flow lines, etc., ten pounds of abrasive per charge is suggested as a minimum. Paraffin or hydrocarbon deposits being harder in some lines than others, require more of the abrasive, and an approximate maximum charge of 100 pounds is recommended where the deposit is very hard or very thick.

Example 2—The riser may be broken below the choke, the soluble abrasive poured into the broken connection, and after the riser is connected again, the well is allowed to flow, thus creating the necessary abrasive action.

Example 3—Insert a "T" below the choke and use this connection more or less as a funnel to receive the abrasive. After the abrasive has been introduced, a bull plug may be inserted in the open-

Date February 18, 1942

State Louisiana **Parish** Rapides **Field** Cheneyville

Operating Company _____ **Farm** _____ **Well No.** 15

C. P. 1000 **Lbs. psi** **Tubing** 2 **inches**

T. P. 600 **Lbs. psi** **Casing** 5½ **inches**

Choke ½ **inch** **Flow arm** _____ **inches**

Production per 24 hours 180 **bbls.** **Flow line** 2 **inches**

Gravity 44°

Separator pressure 150 **lbs. psi**

Flow line pressure before 400 **lbs. psi**

Flow line pressure after 200 **lbs. psi**

Explain point flow line pressure taken at well

Length flow line 2200 **ft.**

Shakeout at Separator before injection 80 percent

Amount remover used 16 **lbs.** **Introduced at** well

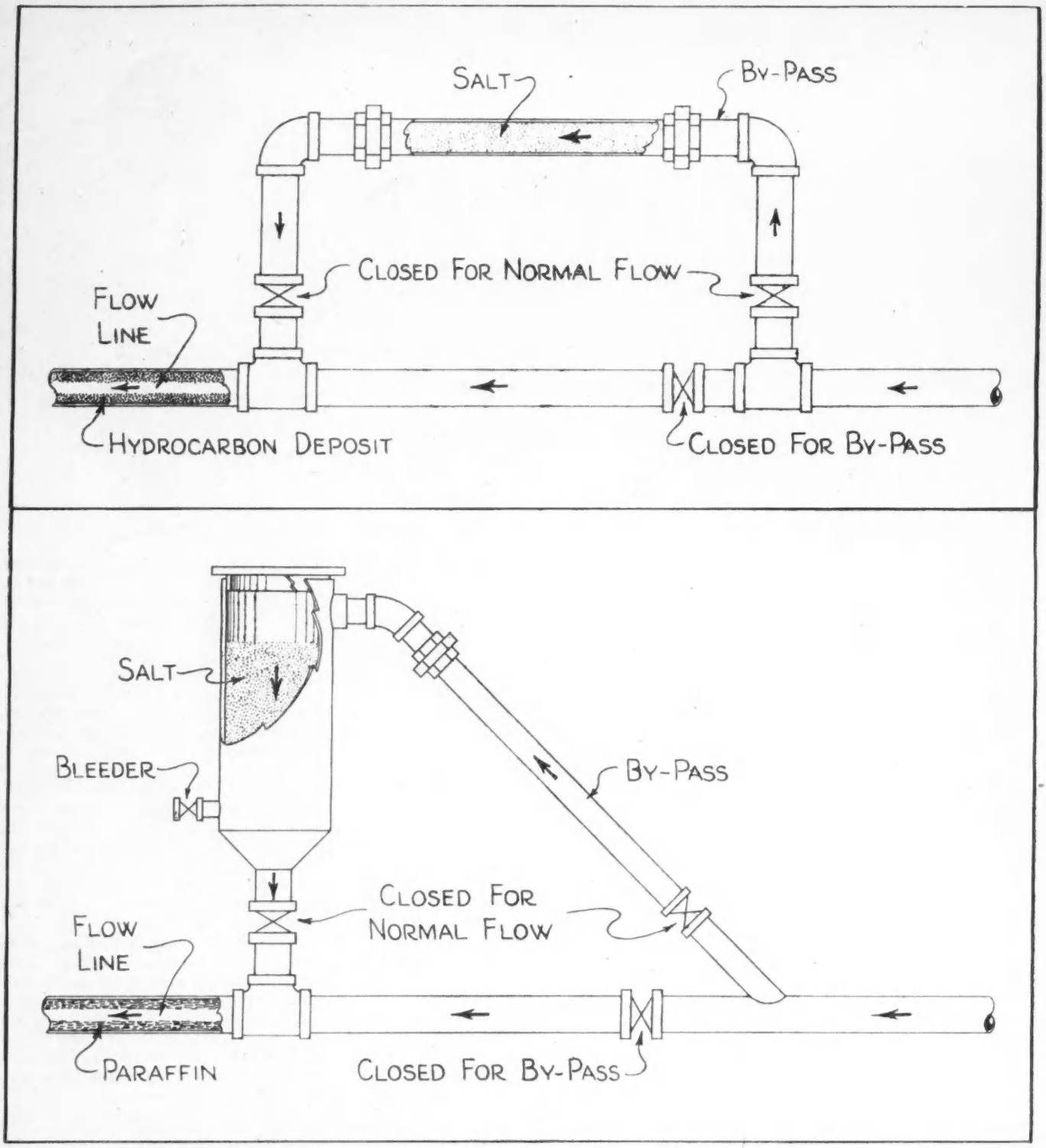
Time consumed job 1 hour

Flow line—How cleaned previously: Paraffin solvent

How often cleaned 2 weeks

(Signed) _____

This field data sheet was prepared from actual experience using 16 pounds of salt to remove paraffin deposit from a flow line of a well in Cheneyville field, Louisiana. Notice there was a drop of 200 pounds in flow line pressure after the soluble abrasive (salt) was introduced into the line.



Two of the several methods of introducing salt to flow lines. Top, by-pass inserted. Lower, hopper inserted.

ing and the well opened, allowing the abrasive action to occur in the line from the point where the soluble abrasive was introduced.

Example 4—If a "T" is placed below the choke as in Example 3, a hopper may be inserted in the "T" in place of the bull plug. The use of a hopper is probably the easiest method. This hopper may be made from materials found around oil fields and can be easily carried from job to job. This method will prove most satisfactory when working with lines under pressure. In lines lacking pressure, such as pumpers, the pressure may be obtained through the use of oil pressure pumps or a line taken from a nearby pressure line. Results obtained by practicing these methods have been found excellent in that the oil flow returns to normal.

Sand Undesirable

Sand has been proposed as an abrasive at one time or another, but from a comparative standpoint, sand is impracticable as well as dangerous when introduced into lines. Sand has a definite tendency to adhere to paraffin and to agglomerate with accumulations and deposits of paraffin or other undesirable accumulations, thus clogging the line and making the flow of oil more difficult because the diameter of the hole through which the oil flows is consequently made smaller instead of larger, as when salt it used. In the event salt would, for some reason, clog the line, the remedy would be to flush the line with water, thus dissolving the obstruction. The dissolving action would be through the solution of the abrasive agglomerated with the deposit, which when dissolved would allow the deposit to entrain in the oil stream. Sand could not be dissolved under the same conditions.

ROUND TRIPS

Power Slips

One of the three unusually long slips. Greater slip area and proper tooth design of replaceable inserts mean positive, uniform grip without crushing or otherwise damaging drill pipe, casing or tubing, even when heaviest strings are being handled

SIMPLE, RUGGED CONSTRUCTION

The heavy plate on top of the cylinders forms a swivel base for the main arm, which can be rotated either vertically or horizontally. A latch automatically locks main arm to base plate when mechanism is swung into operating position around drill pipe, tubing or casing.

The three slips are connected to slip ring by links that allow for flexibility and permit easy removal of slips. The slip ring, mounted in main arm on four roller bearings, can be rotated freely.

The two unitized master-bushing ring segments, beveled 30° at the top, guide slips into master bushing. Master-bushing rings *do not reduce full opening of rotary table;* full opening permits passing of all protectors, tool joints and couplings. Adjustable cushioned stops limit upward and downward travel of slips. Slips are pressure-locked in both raised and set positions; but in case of a power failure when slips are raised, the safety stop prevents slips from dropping.

(Right) These are the working positions for fast, smooth round trips. Slips are set or raised by a simple movement of the driller's foot lever. Slips are pressure-locked in both raised and set positions. In case of a power failure when slips are raised, the safety stop prevents slips from dropping.

(Above) Snaking slips from out-of-service position into working position with the catline is simple and fast. Note how main arm swings open on hinge pin, and how slip ring segment is locked to hinged arm for this operation. After dropping the mechanism into working position, the main arm is swung closed and the chained retaining pins are reinserted.

BJ

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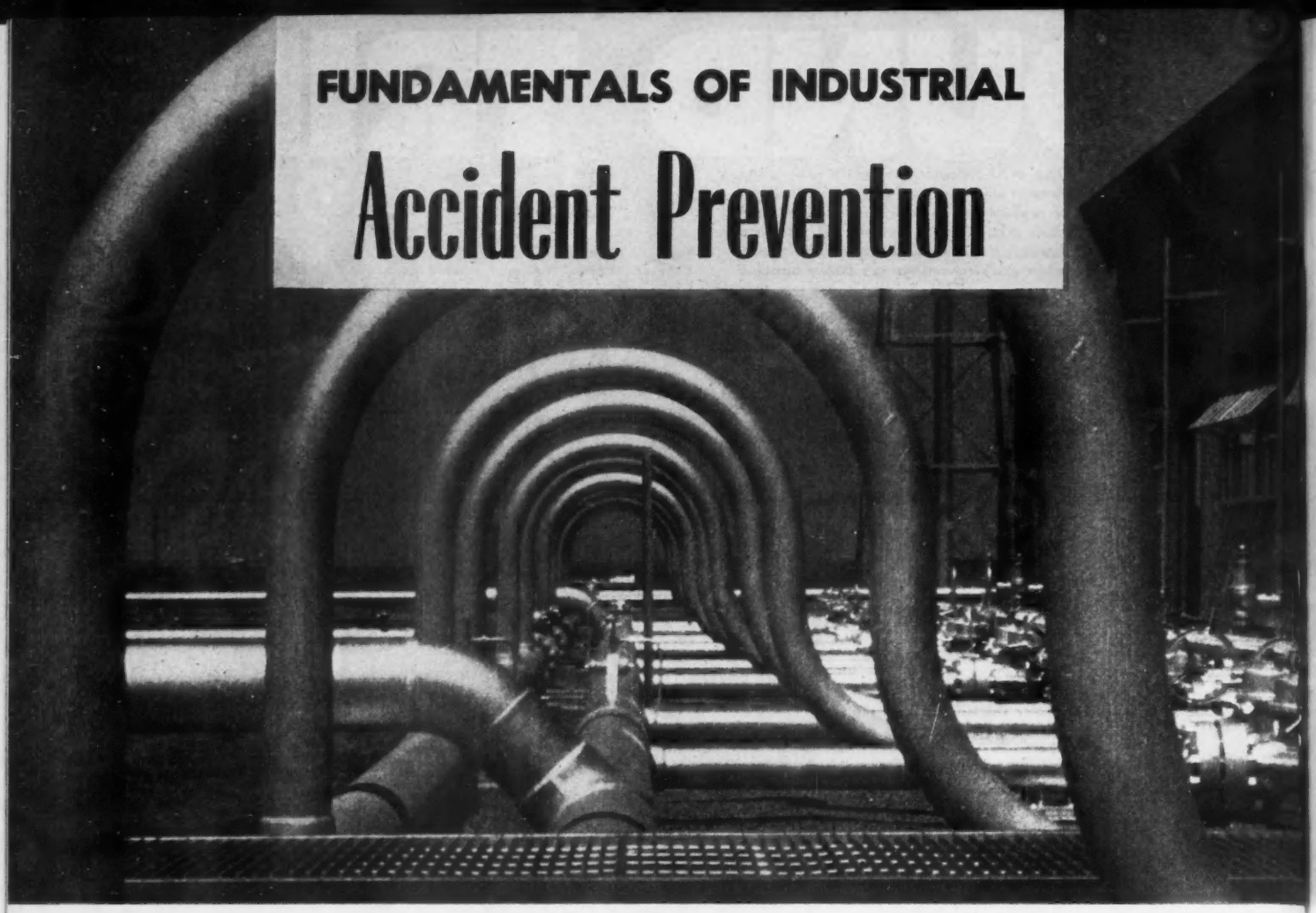
FUNDAMENTALS OF INDUSTRIAL

Accident Prevention



Good housekeeping practices are illustrated in this picture emphasizing the expansion bends in inlet and outlet headers at compressor station.

Part 12

Assistance from Outside Sources

By C. L. HIGHTOWER, Safety Director
United Gas Pipe Line Company and Union Producing Company

IN ORDER to keep informed on the most advanced safety measures, and to keep alive the accident prevention program by feeding in new ideas, it is necessary to draw on every available source that offers practical assistance. Many companies follow the plan of exchanging information on accident experiences and methods of prevention through frequent contact with other companies in the same industry and by interchange of accident cause reports and safety information bulletins. Many trade organizations such as the American Gas Association, The American Petroleum Institute, Associated General Contractors and others provide accident prevention information and services to their members.

From the standpoint of the casualty insurance buyer the most direct and specialized accident prevention service can be obtained from the insurance carrier. Most casualty companies maintain a safety engineering staff qualified by training and experience to study and analyze the individual risk, and to assist in setting up a safety program suited to the needs and requirements of the particular industry or type of business.

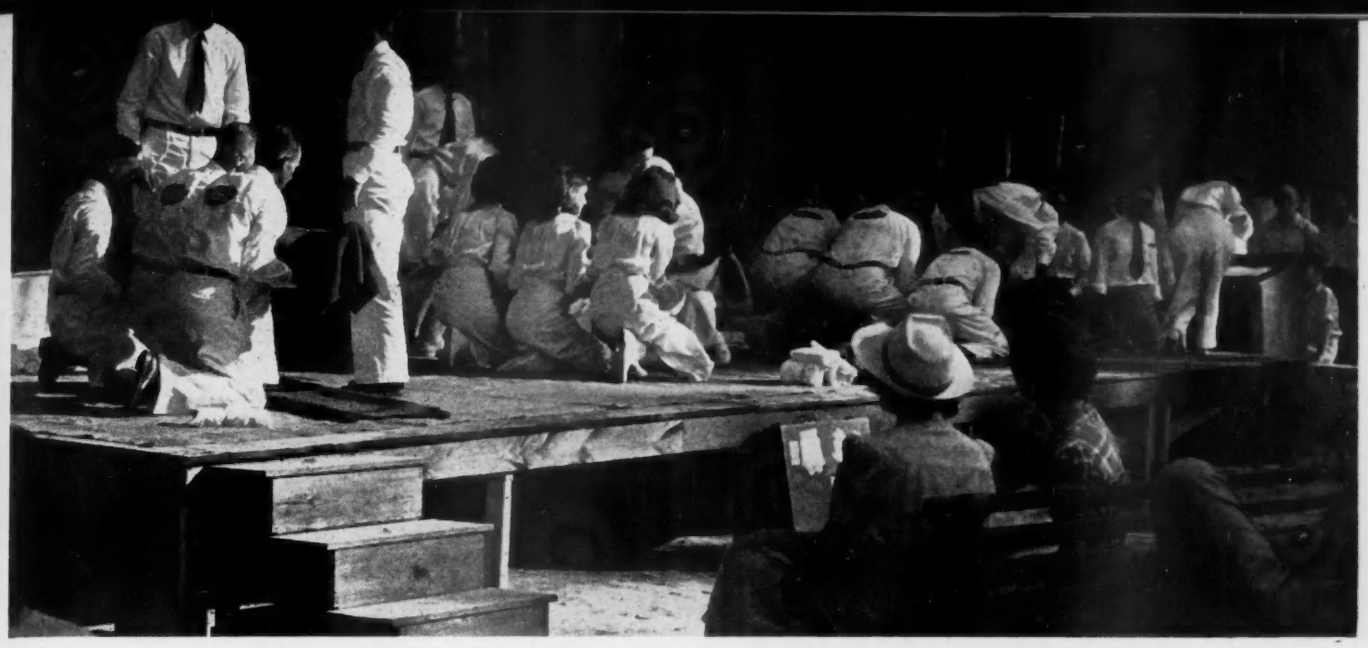
In addition to the service provided on accident prevention organization, casualty insurance companies also are equipped to furnish various types of specialized inspection services, depending on the nature of the risk, the type of insurance carried, and the needs of the assured.

Among the many engineering and inspection services available to the assured are:

1. Study and analysis of the risk to determine the frequency of accident occurrence and the nature and source of the accidents.
2. Inspection of the plant for physical hazards and unsafe work practices.
3. Survey of sanitary conditions to determine occupational disease and health hazards.
4. Advice and assistance in setting up a safety organization to meet the needs and requirements of the assured.
5. Assistance in the development of safe practice guides and manuals for use of the operating personnel in establishing accident prevention as an integral part of operating procedure.
6. Survey of personal protective equipment needs and advice and assistance in the purchase of such equipment and in training the operating personnel as to its use and maintenance.
7. Periodical inspection service on elevators, boilers, machinery and special equipment, and advice and assistance in the proper care and operation of same.
8. Supply safety posters, booklets, and similar educational material for use of the assured.
9. Assistance in setting up a system for keeping accurate records of accident frequency, severity and costs, and develop reports for comparative purposes.
10. Consultation service on new or unusual operations in an effort to locate and correct accident causing conditions and practices.

National Safety Council

The National Safety Council is recognized as the leading safety organization in the U. S. From its humble beginning with a handful of enthusiastic safety leaders who met in 1913 to formulate organization plans, the Council has grown to a paid membership of more than 6000 organizations and individuals, representative of every branch of industry, local and state safety organizations, departments of city, state and national governments, civic clubs, and the in-



Company first-aid teams participate in contests at a barbecue outing awarded employes of district for completing 1 million man-hours without a disabling injury.

surance fraternity. About 10 million workers are represented by the industrial membership. It provides a complete service that embraces the industrial, home, highway and public safety fields.

Through its sectional organization setup, the Council is equipped to bring together the knowledge and experience of large groups of safety men and technically trained engineers to study the special problems of each industry. By pooling experiences in this way, the best and most practical safety methods can be developed and standardized.

At present there are more than 20 industrial sections functioning within specific industries. The principal sections:

Aircraft manufacturing section
Air transport section
Automotive and machine shop
Cement and quarry
Chemical
Coal mining
Construction
Food
Industrial nursing
Marine
Meat packing, tanning and leather industries
Metals
Mining (metal)
Paper and pulp
Petroleum
Power press
Public utilities
Rubber
Steam railroad
Textile
Transit
Wood products

There are three other industrial sections which do not confine their activities to specific industries; instead, they relate to specific phases of all industries. These sections are:

ASSE—engineering
Employes' publication
Commercial vehicle.

Following are a few of the services rendered by the National Safety Council, with a brief description of the manner in which these services can best be utilized by industry:

1. *Safety Poster Service.* The Council develops and releases annually a variety of safety posters. These cover both general subjects and specific hazards of the various industries. They are produced plain and in colors. A quantity of posters is furnished, without additional cost, to each industrial member and additional requirements may be purchased at a nominal cost.

The bulletin board can be made an effective medium for safety training, if the board is attractive in appearance, the posters changed frequently and regularly, and a proper display arrangement followed. The National Safety Council's poster service affords a wide variety of subjects to choose from, and when supplemented by posters developed within the plant, will be found adequate for a complete poster educational program.

2. *National Industrial "No Accident" Contests.* Many of the industrial sections conduct annual contests for members. Companies are classified into groups in accordance with the number of man-hours worked and the winner in each division receives an attractive trophy. These contests are instrumental in stimulating interest among employes in competing companies through the development of a spirit of teamwork and pride in the company record.

3. *Instruction Card Service.* From time to time the industrial division of the Council releases instruction cards on specific hazards, such as "Handling Sulphuric Acid," "Night Driving," and "Storing Flammable Liquids." The information contained in these instruction cards is very practical and can be effectively used in instructing workmen on specific hazards.

4. *Industrial Data Sheets.* These are similar to the instruction cards, the difference being that they cover a complete operation rather than a specific hazard and include more detailed information.

5. *The National Safety News.* This is a monthly magazine devoted principally to industrial safety in both large and small plants. Coverage is also given to the "off-the-job" aspect of the industrial safety program, including home, traffic and public hazards. It features articles on safety programs which have gotten results in these fields. It is an effective medium for keeping department heads and executives informed on the national safety movement.

6. *The Industrial Supervisor.* This magazine includes the material on foremanship safety problems, and it features practical suggestions on the correction of accident causing conditions, including mechanical guarding, good housekeeping, and training of workmen. Many companies furnish a copy to each foreman for study and guidance.

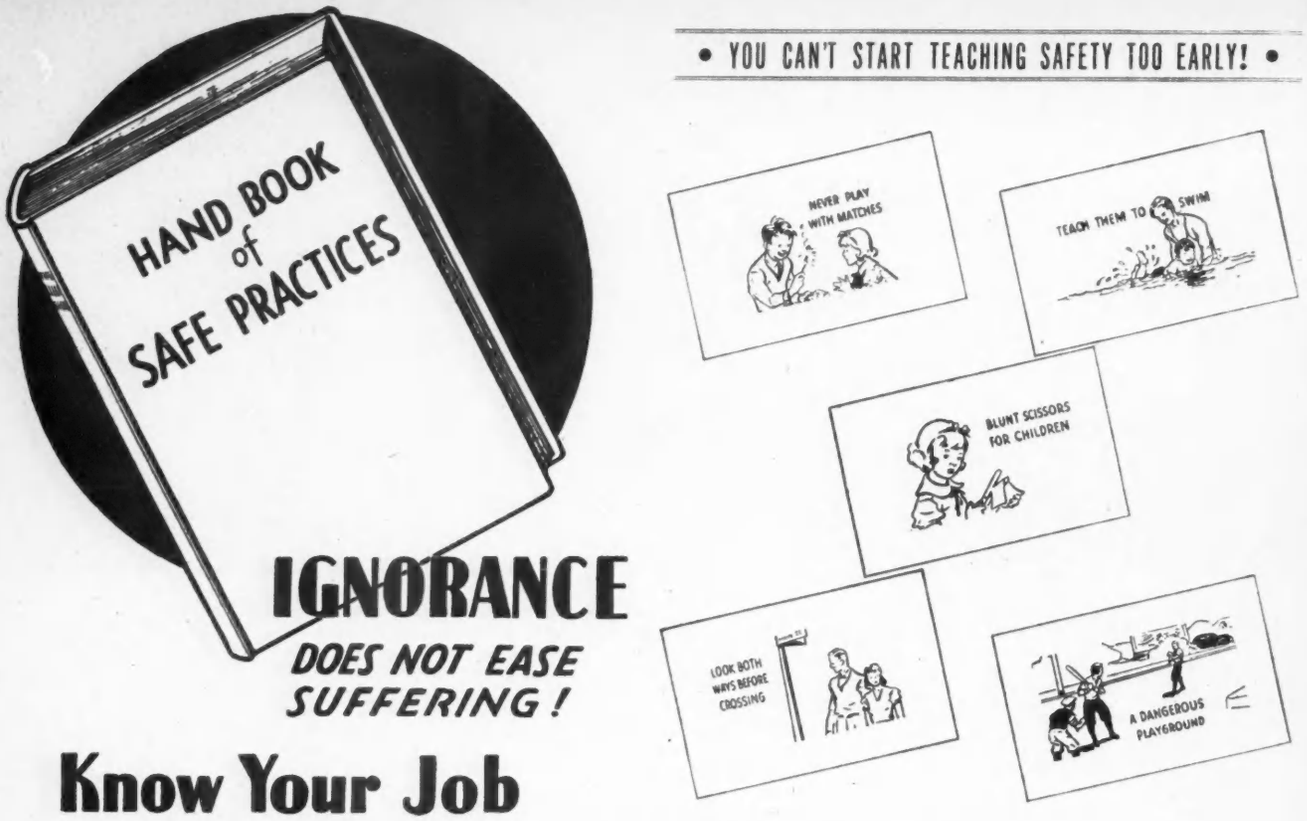
7. *Public Safety Magazine, etc.* In addition to the publications listed above, the Council also releases numerous other papers and magazines, such as *Public Safety, The Safe Worker, The Safe Driver,* and *School Safety.* This material is very helpful in safety program outlines and employe publications for use in the organization.

8. *Accident Facts.* In addition to compiling statistics on industrial accidents, the Council also gathers accident data on highway, home and public safety, and each year publishes *Accident Facts,* which includes interesting comparative tables and illustrations that give a complete picture of progress in the several fields of safety.

9. *Safe Practice Pamphlets.* Safe practice pamphlets dealing with specific operations in the various industries list the hazards involved and outline methods of correction or means of guarding against them. A variety of health and safety subjects in industries are covered in the Council's hundreds of pamphlets and its "Safe Practice Set" is a worthwhile addition to the Safety Engineer's library.

10. *Commercial Vehicle Fleet Contest.* This contest among fleet operators in the different industries is effective in developing driver interest in street and highway safety. The prizes awarded annually to the winners in each division are particularly attractive. Entry in the contest entitles members to contest posters, bulletin releases and other special services.

11. *Section News Letters.* Most of the major industrial sections publish monthly news letters. These carry reports of serious or unusual accidents, reports of special studies on specific problems, and other pertinent accident prevention information. The news letter offers a source of information to draw from in



To-the-point posters encourage good safety habits among employes.

preparing company safety publications.

12. *Annual Safety Congress.* The annual Congress sponsored by the Council attracts about 10,000 delegates and features a varied program of technical discussions on safety problems. These meetings are both instructive and inspirational and the opportunity afforded for an exchange of ideas and experiences is of inestimable value.

13. *Sound Slide Films.* The Council has a large and constantly expanding sound slide film library. The subjects deal with fundamental problems of accident prevention and are suitable for use in any type of industry. One set of ten films deals with Foremanship Responsibility for Safety and is particularly well suited for foremen's meetings and conferences. Discussion outlines are furnished with these films for use of the conference leader in drawing individual members of the group into the discussion, and in emphasizing the supervisor's responsibility for safety training, job planning and followup in order to insure safe operations. Films for employe groups emphasize the individual's responsibility for safe work practices and the need for close cooperation to insure harmony in the crew and department.

14. *Individual Consultation Service.* The Council maintains a headquarters staff of qualified safety and health specialists who are available for consultation and advice to members who have special safety problems. The large library of safety information and accident facts which the Council has accumulated from every type of industry and from the various government, state and local agencies over a long period of years provides a wealth of material from which member companies may draw.

American Standards Association

The American Standards Association, which has rendered such outstanding service to American industry through its program of standardization for materials used in manufacturing processes, as well as the development of standards for finished products such as piping, lumber, valves, keys, gears and a hundred other items, has placed the full weight of its experience behind the safety movement.

The Association has compiled and published standards and codes affecting almost every branch of industry. These publications are widely used throughout industry and are the backbone of state industrial regulations. The National Safety Council, insurance companies, the various states and other interested groups pool their efforts in building American Safety Standards under the procedure of the American Standards Association.

American Safety Standards bulletin PM 87 gives a description and complete list of approved standards and codes. This list includes a variety of subjects from accident causes to toxic dusts and gases. The complete file of standards provides a wealth of valuable reference material and will be found helpful to the Safety Engineer and operating executive in any industry.

National Fire Protection Association

The National Fire Protection Association occupies the same position in the field of fire prevention and control as the National Safety Council in the field of accident prevention. The Association provides its membership with a variety of informative material on methods of fire prevention and fire fighting which can be effectively used by industry in training employes in this important phase of plant and home safety. In addition, N.F.P.A. has developed a variety of codes and standard practices giving the design and installation of fire protection equipment and the use of gas, electrical and other such appliances in industry as well as in the home.

Through its sponsorship of Fire Prevention Week, the Association has directed the attention of the public to the tremendous loss of life and property which results from fires each year in the U. S., and the posters, information pamphlets and other material released for the use of its members, schools, governmental agencies, civic groups and the general public during Fire Prevention Week has been the biggest single factor in correcting many fire hazards in homes, schools and industrial plants over the nation.

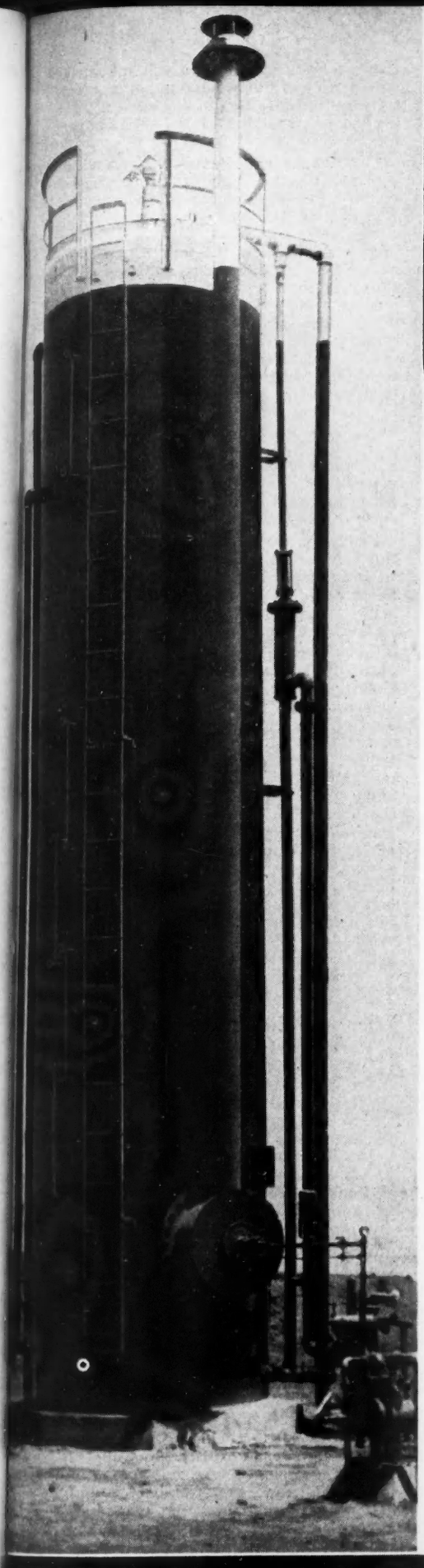
The helpful assistance and instructive information printed by the N.F.P.A. will be found invaluable in planning the plant fire protection program, as well as useful for safety meeting material with employe groups.

The American Red Cross

In addition to its vast program of disaster relief, war relief, and similar emergency services, the Red Cross devotes a large share of its efforts and resources to accident prevention, during both war and peace times, through its First Aid Training Work, Life Saving and Water Safety program and Home Safety services. Red Cross trained first aid students and water safety experts have a record of thousands of lives to their credit.

The following manuals published by the Red Cross are recognized as authoritative in their field. They contain safety facts of special interest to Safety Engineers and operating supervisors and are valuable additions to any safety library:

1. Red Cross First Aid Manual.



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A NEW HIGH IN EFFICIENT, ECONOMICAL OPERATION

Parkersburg's new . . . and different . . . Self-Insulating Treater has just about eliminated "impossible" oil treating problems from the list.

Since its introduction, this revolutionary treater . . . the best means of converting well flow emulsions into pipe line oil at less cost per barrel . . . has continually solved oil treating problems first considered impossible.

Parkersburg's Self-Insulating Treater employs the basic principles of treating emulsified oil through heat, yet these same basic principles are applied in a different manner to achieve a new high in efficiency, economy and dependability.

This treater was designed to produce more pipe line oil per barrel of fluid, at less cost per barrel. And it does!

Check the features of the Parkersburg Self-Insulating Treater. Then ask your Parkersburg Representative for any additional information you may need. He's as near as your phone. He'll quote you specific cases where the Parkersburg Self-Insulating Treater has solved seemingly impossible treating problems.

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FEATURES:

When desired, hot water recycling system preheats fluid in inlet line before it reaches the inside of the treater.

Excess gas in fluids is allowed to escape in upper compartment and cannot be carried into settling chamber.

Slow Settling between inner cylinder and shell also allows free escape of gas in solution, preheats fluid and provides insulation to prevent loss of heat to atmosphere.

Advanced design of heating elements provides more efficient use of fuel and transfer of heat to fluids and eliminates "hot spots" and excessive scale deposits.

Ample supply of hot salt water and baffles assure thorough washing and distribution of fluid.

Unusually large space above baffles to provide quiet space for water to settle out of oil.

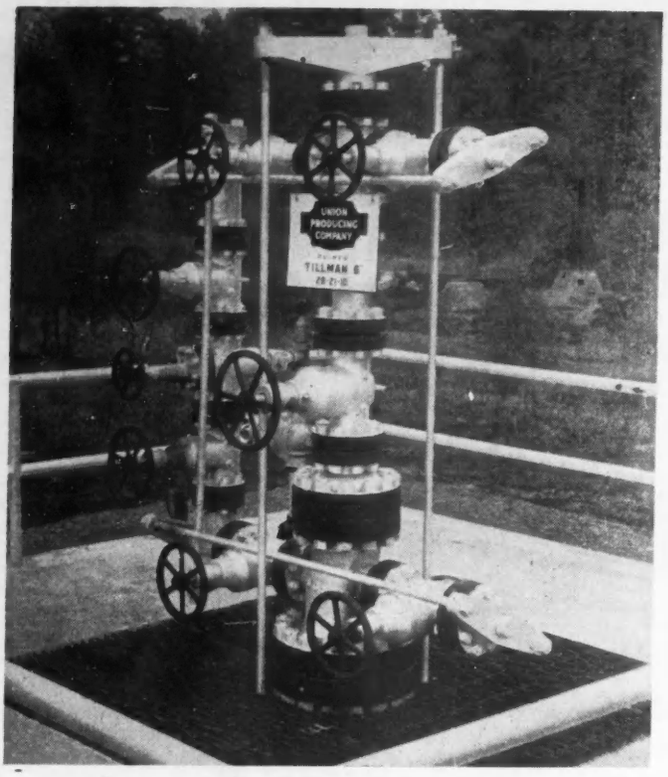
Provision for cooling gas from hot oil before it passes into mist extractor and scrubber.

Design minimizes and controls any tendency of fluid to foam. In case of foaming oils, foam can be recirculated through heating compartment.

Removable baffles to facilitate cleaning or installing excelsior if desirable.

Adjustable oil settling height and salt water bath.

PARKERSBURG



Cleanliness promotes safety. This attractive Christmas tree arrangement showing concrete floor, steel grill and metal guard rail serves as an inducement to employes to keep properties clean, safe and attractive.

2. Life Saving and Water Safety Manual.
3. Home Safety Manual.

Industries and commercial concerns can obtain assistance from local Red Cross chapters on their first aid training program and may also make use of the chapter's advisory and consultation service on other safety problems.

Governmental Agencies

Many of the states provide industry with a helpful safety service through state industrial safety commissions, labor departments and health and sanitation departments. This service often includes factory inspection services, hygiene and health surveys, inspections for occupational health hazards and the development, in cooperation with industry, of state safety codes for hazardous occupations.

These agencies have been created to help industry with its health, sanitation and safety problems, and by close cooperation, full use of their services can be made to the mutual benefit of employer, employe and the community.

Among the federal government agencies which have been most active in the field of accident prevention are the U. S. Bureau of Mines and the Labor Standards Division of the U. S. Department of Labor.

Although the Bureau of Mines was created to serve the mineral and allied industries, its safety division has done a great deal of research work which has been beneficial to industry in general. Bureau reports on the investigations and studies made by its engineers are nationally recognized for their accurateness and completeness. Through its first aid training program in the mine, mineral and allied industries hundreds of thousands of workers have received expert training in first aid practices, and as a result the lives of thousands of workers and members of the general public have been saved. The content of Bureau of Mines and Red Cross first aid training manuals are similar, and there is little difference in the basic fundamentals covered.

The Joseph A. Holmes chapters, which are sponsored by the Bureau, have been particularly effective in furthering both the industrial and community safety movements in many locations throughout the country.

A list of the safety publications available through the Bureau of Mines may be obtained by writing the bureau direct or by addressing the Government Printing Office, Washington, D. C.

The Labor Standards Division works closely with state industrial commissions, state labor departments, industry, The American Standards Association, The National Safety Council and other interested agencies in developing safety standards, codes and manuals. Through its staff of technically trained engineers, the Division has developed and released hundreds of posters, pamphlets and reports dealing with the many and varied problems of safety training, mechanical guarding, safety committee organization, and factory inspection.

This service was extended and intensified during wartime to help combat the rising tide of accidents in war industries which so seriously affected the country's output of the implements of war needed by the Allies and U. S. fighting forces.

Employe using goggles and cartridge type respirators while spray painting.

During the emergency the peacetime services of the Labor Standards Division were supplemented by the creation of the National Committee for the Conservation of Manpower in War Industries. Through the activities of this committee more than 400 industrial safety engineers contributed their services on a part-time basis to plant visitation, consultation and industrial safety training work. Thousands of key supervisors were trained in the fundamentals of accident prevention through the safety engineering training program sponsored by the Committee, the U. S. Department of Education and selected engineering colleges. That the effect of this practical and long range program of accident prevention indoctrination is carrying on in peacetime and exerting a lasting influence throughout industry is evident.

A list of the services, reports, bulletins and other safety material available to industry through the Division may be obtained by writing the Labor Standards Division, U. S. Department of Labor, Washington, D. C.

The Training Within Industry Program, sponsored by the War Manpower Commission, has provided industry with new tools and techniques in the training field. Although the program is an outgrowth of the war and was designed for the specific purpose of quickly training the thousands of new supervisors and workers employed by industry in the expansion made necessary by the war effort, its effectiveness and simplicity has won wide acclaim and ready acceptance by industry in general. The benefits of these short and intensive training methods will be lasting and full use of the tools and techniques developed by T.W.I. will continue to be used in industry in the postwar era.

The three courses developed by T.W.I. and available to industry are:

Job Instructor Training
(Designed to teach supervisors how to instruct workers)

Job Methods
(Designed to teach supervisors how to analyze job procedures and improve work methods and processes)

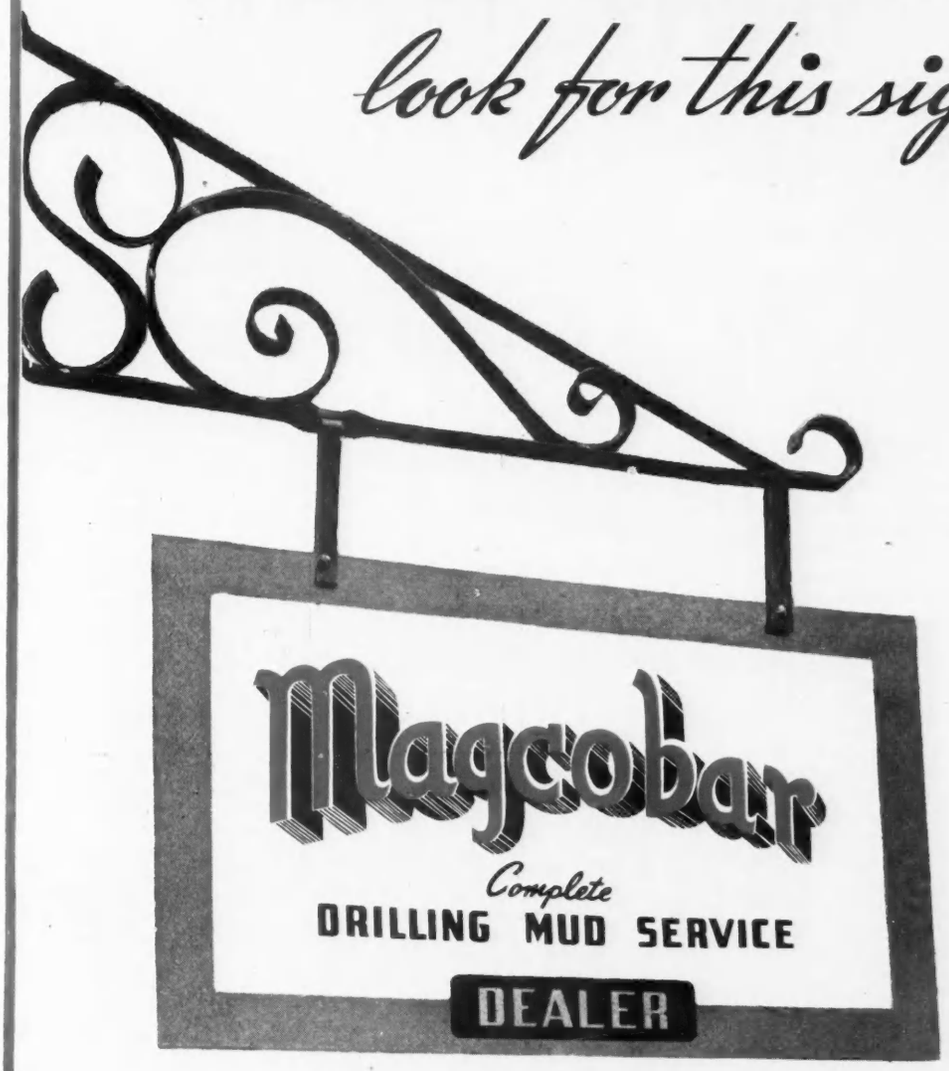
Job Relations
(Designed to teach foremen how to improve and maintain employe relations).

Additional information on this program may be obtained by addressing U. S. Department of Education, Washington, D. C.

It is not possible to list all the agencies that offer a source of help to industry in solving its accident prevention problems. Neither is it practical to enumerate in detail the many and varied services available through each agency. However, it is hoped that sufficient information has been given to enable the safety engineer and operating supervisor to find the source of help or type of information and material best suited to his needs, and also that the list of agencies given, although incomplete, will indicate the widespread and growing interest in the industrial safety field, and the wealth of experience from which the uninitiated can draw in developing and administering the accident prevention program.

NEED MUD...

look for this sign!



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MAGNET COVE BARIUM CORPORATION

Houston, Texas **Malvern, Arkansas**

Acidizing

INCREASES WATER INTAKE RATES

By R. J. PFISTER, Director Production Research Laboratory,
Pennsylvania Grade Crude Oil Association

HEREWITH is the result of experimental acidizations undertaken by the research staff of the Pennsylvania Grade Crude Oil Association in an effort to increase the efficiency of water intake wells.

An efficient intake well is one which moves the maximum oil to the producing well with a minimum amount of by-passing water. In old intake wells there is almost always some sort of filter cake on the sand face which further reduces the water intake rate of the tight sand. These sands often contain the most oil, but due to this filter cake, are inefficient producing strata. It is desirable to devise means not only to dislodge and dissolve this filter cake but to open solution channels into the tight sand. Often even a new well which has been selectively shot may not take as much water as is desired. Thus, an increase in intake may be required as an accessory to shooting of certain new wells.

In a paper entitled "Effects of pH on Water Intake Rate of Oil Sands," J. N. Breston and W. E. Johnson of the association's research staff, pointed out how to increase the intake rates by use of low pH waters and brines. This effort on experimental acidizing is directed to make a permanent change in the well. Low pH water and brines show a favorable effect only as long as these waters are entering the sand face; the rates decrease when fresh water is again injected, but acidization is directed to leave a permanent change in the well which will maintain a permanent increase as long as clear, sediment-free water is injected in the well.

Acidization of production wells has become very successful in other areas, particularly in limestone formations, but more recently sandstones have also been successfully acidized with the development of special acids. In these wells, a treatment often involves the use of 3000 or more gallons of acid injected at several thousands of pounds pressure. While such practice is rather common, the equipment is elaborate and the service expensive in secondary recovery operations.

It therefore seemed desirable to carry out some experiments with acidization in an attempt to devise an inexpensive treatment. In order to determine if these experiments are truly successful, it is necessary to follow the water input rates before and after acidization and to gauge water and oil production. The work to date is only a start but the results are encouraging. The desired method of preparing a well for acidization and the one ordinarily employed is described. The individual well acidizing treatment will be explained with the results of nine experimental tests.

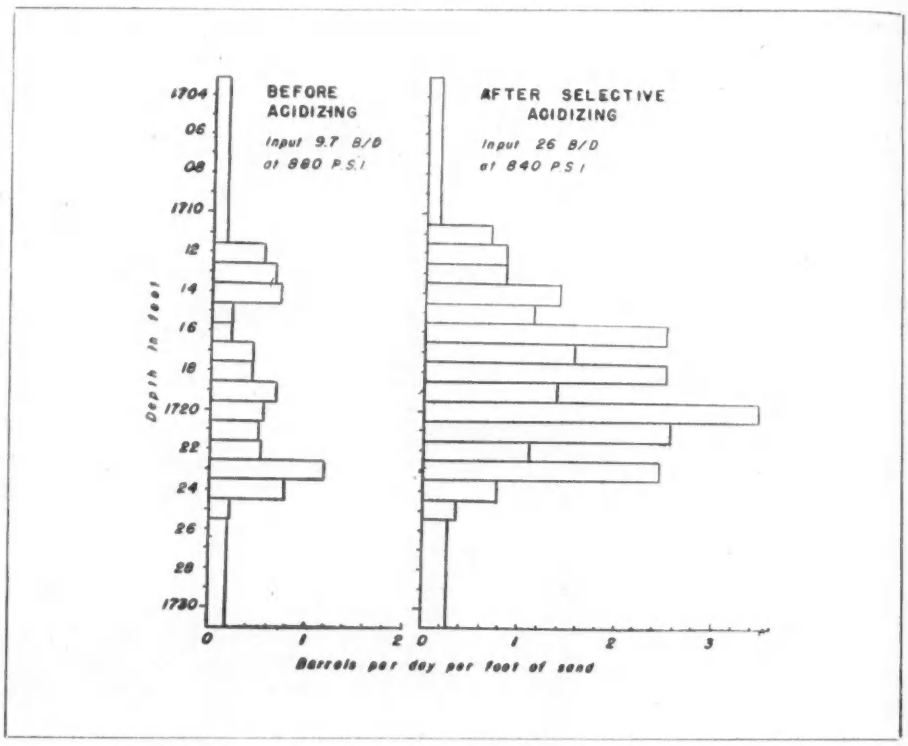

Figure 1. Water input profiles before and after selective acidizing.
Treatment: 12 gallons 30 percent HCl 0.2 percent inhibitor. Pressured twice to 600 pounds per square inch. Shut in twice for 16 hours.

Prior to acidization, the intake well is washed out through a 1-inch or ¾-inch macaroni string so that all loosely held solid materials are jetted from the sand face. The well head is fitted with a "Christmas Tree" piping arrangement to permit injection of high pressure water either down the macaroni string or through the regular well tubing. A rotary swivel head and high-pressure rubber hose on the macaroni string are a great help in washing the well since it permits turning and raising the water jets along some 20 feet of sand face. Loose materials are more easily lifted up the small macaroni string than up the 6¼-inch well bore and through the regular well tubing; however, heavy filter cake of sediment on the sand face is more efficiently dislodged with high pressure water from a few jet openings in the macaroni string than it is with the water moving down the hole from the well tubing.

First Acidization Experiment

The first attempt at selective acidizing in the Bradford area was carried out in conjunction with water-input profile measurements and, therefore, foot by foot intake rates are available before and after treatment. The original intake rate shortly after drilling the well was 60 barrels per day at approximately 1000 pounds per square inch plant pressure for about 30 feet of sand. After two years the rate dropped to 30 barrels per day at the same well-head pressure. Much unfiltered brine was injected during three months' experimental work with water-input profile measuring device and the well was also selectively plugged, which together resulted in a decreased intake of only 9.7 barrels per day.

The original core report of the well showed that the sand above 1716 feet was permeable and pronounced largely "watered-out." Since the lower section had high oil saturation but was extremely tight (averaging less than 2 millidarcies) it was desired to confine the acidizing treatment to this area (1716 feet and below). The presence of the water input probe in this well afforded ideal conditions for controlling the upper water-acid boundary during the acidizing treatment. The acid was introduced through ¾-inch macaroni string to the bottom of the well and the upper area covered by the acid could be located with the probe and

held with water pressure within the desired area. The acid was washed to the bottom with one barrel of water and pressured for about seven hours to maintain the acid boundary at a 1716-foot depth or slightly below. The acid boundary was maintained at 1716 feet by injection of water in the two-inch pipe to lower it or in the ¾-inch string to raise the boundary by acid dilution.

The lease pressure was again permanently applied and several water-input profile measurements were made during the next few days. The results of these measurements together with those just prior to acidization are shown in Figure 1. It is interesting to note that a substantial increase in total intake rate was effected with a relatively small amount of acid used (only 12 gallons), and that this increase was selectively held to the area below 1716 feet as was desired. This acidization experiment was successful in each of its aims. Another test made a year later on the same well will be described later.

A consideration of the nature of this formation to be acidized invited a trial of hydrofluoric acid along with hydrochloric acid. Bradford sands contain, in general, only a very slight amount of material which is soluble in hydrochloric acid; hence, the addition of hydrofluoric acid should be highly beneficial in opening solution channels. Hydrofluoric acid is extremely corrosive and will dissolve not only metals but sand and clay. It is used as a 50 percent water solution and in conjunction with a large amount of hydrochloric acid. The less expensive hydrochloric acid not only extends its use but also prevents subsequent precipitation and possible plugging of the sands if the acid becomes prematurely neutralized.

Since hydrofluoric acid causes extremely bad skin burns it must be handled with absolute care to avoid the slightest personal contact either by splashing or breathing the vapors. One of the simplest but most effective precautions is to have one or more five-gallon buckets of water available for immediate and thorough washing wherever any type of acid is handled. Likewise a hose of running water should be at hand and goggles should be worn to protect the eyes.[1]

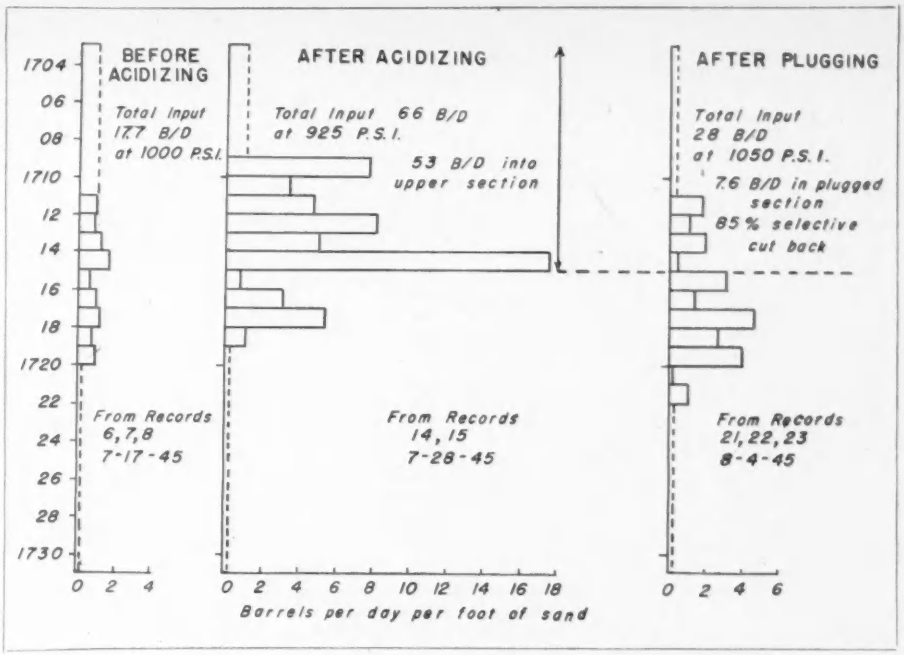

Figure 2. Water input profiles before and after acidizing.
Treatment: 100 pounds 50 percent HF and 48 gallons 30 percent HCl.

Subsequent Experiments

After about ten months the same well mentioned before was again acidized but a different technique was used. First, ten gallons of hydrofluoric acid were used in addition to the hydrochloric acid, and then the well was acidized at hydrostatic head rather than under controlled lease pressure. The first of these changes, namely the use of hydrofluoric acid along with the hydrochloric acid, jumped the intake rate from 17 to more than 70 barrels per day. An incidental observation on an old input well 65 feet away showed pressure two days after acidization, although normally that well showed a vacuum. The second change in technique of using only hydrostatic pressure for acidization was found in this case to be a poor choice as shown by the water-input profile taken before and after this acidization (see Figure 2). The principal increase in intake rates was in the loose upper sands. This was undoubtedly due to the fact that the tight sands were continually backflowing so that the acid practically did not contact them. The backflow water served not only to insulate the acid from the tight sand but diluted the acid to some extent and washed it up into the more permeable sands whose backflow was the first to stop. The greatest increases in intake rates were in the more permeable section, but this section was designated as "watered-out" in the core report. Of particular interest is the section between 1713 and 1714 feet which took as much water after acidization as the entire well did just previous to acidization.

Since this acidization procedure distinctly gave results of reverse selectivity, it was decided to carry out subsequent acidization under at least a partial pressure schedule so that some of the acid is forced into and out of the tight sands. An attempt to correct the reverse selectivity affected by this acidization was made by a selective plugging service designed to plug only the upper strata. The selective plugging was successful as shown by the water-input profile (Figure 2), where an 85 percent decrease was affected in the top sands.

The third acidization was performed on an old well in a different area where the sands were relatively tight and the backflow water was exceedingly black. The latter might indicate that considerable plugging had taken place due to iron sulfide and bacteria. This well was selected for hydrofluoric acid treatment in order to find out if a marked improvement could be made over acidization with hydrochloric alone. Although no great detail was available as to how many other wells were acidized at hydrostatic pressure and with hydrochloric acid alone, the resulting increase affected by the addition of hydrofluoric acid of six to 18 barrels per day was reported as outstandingly successful.

Another improvement in the acidization procedure is the use of a wetting agent added to the acid. About 40 milli-

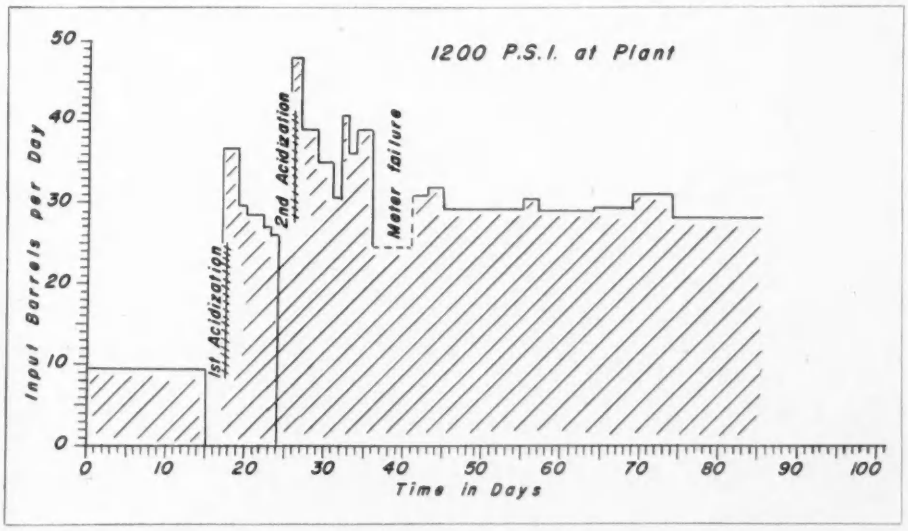

Figure 3. Input rates after acidization of an old input well.
First treatment: 48 gallons 30 percent HCl, 60 cc wetting agent. 48 hours at hydrostatic pressure. Second treatment: 24 gallons 30 percent HCl, 100 pounds 50 percent HF, 12 gallons 30 percent HCl. Pressured for seven hours, shut in 15 hours.

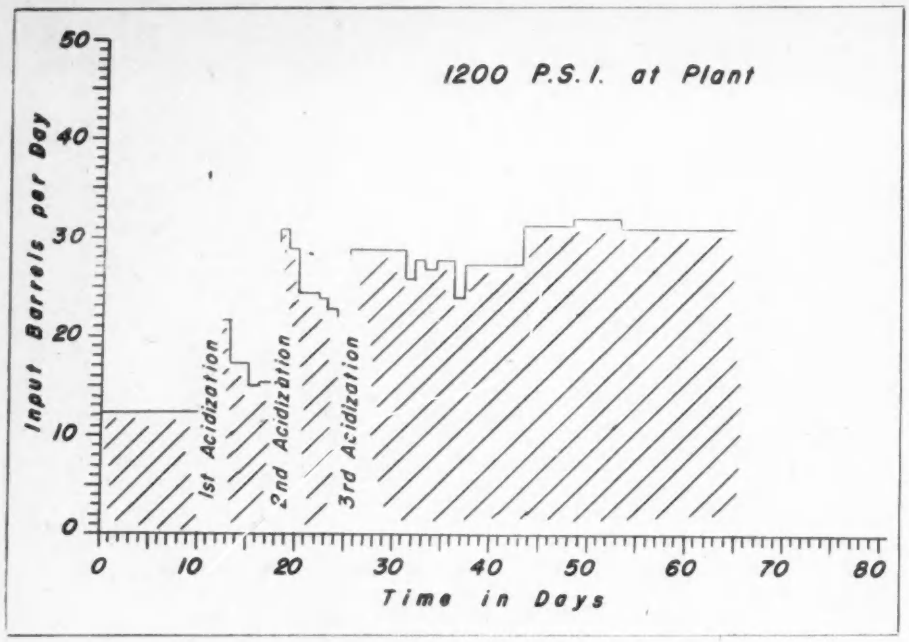

Figure 4. Input rates after acidization of an old well.
First treatment: 48 gallons 30 percent HCl, 160 cc wetting agent, 48 hours at hydrostatic pressure.
Second treatment: Same as first but pressured for seven hours, shut in 15 hours.
Third treatment: Same as second but acid jetted against formation.

darcies per 12-gallon carboys makes the acid froth and thus greatly improves its wetting power in an oil and slimy input well. The wetting agent also acts as a corrosion inhibitor for iron. In practically all of these acidizations, however, commercially inhibited hydrochloric acid was used containing an inhibitor which it did not precipitate from solution as other acid inhibitors did upon dilution.

Figures 3 and 4 show the total intake rates in two wells before and after acidization. These wells received two and three separate acidization treatments as shown in Table 1. The first treatments were at hydrostatic pressure since they were aimed mainly as cleaning the sand face. The second and third treatments were aimed at forming solution channels in the sand so the acid was forced into the sand for six or seven hours and then "shut-in" for 15 hours and then backflowed and washed out of the well. In each of these wells favorable increases were observed varying from 9.5 and 12.5 to 29 barrels per day.

The remaining treatments are summarized in Table 1 and show encouraging results in all but one case and that was a well where the producer asked that only hydrostatic pressure be applied. In that case backflow isolated most of the acid from the formation and hence no new solution channels were formed. The success with the other wells which were acidized under pressure indicates that the acid should be forced into the formation but backflowed before it is entirely spent; hence, a number of the acidizations were carried out with pressure on the well for two hours and then "shut-in" for two to 16 hours, as seemed convenient. After this the cycle was repeated as often as possible during the next three days, after which the remaining acid was washed from the hole and the pressure permanently applied.

It may be pointed out that the present cost of the chemicals is approximately $5 carboy (12 gallons) for the hydrochloric acid and $15—per 100 pounds for hydrofluoric acid. This makes a treatment of six carboys of HCl and 100 pounds HF cost about $45. Since about half the cost is for hauling the acid, and the result of buying in small lots, and since the price of chemicals (unlike almost anything else) is generally downward, a considerable saving may still be realized in treating a large number of wells.

Additional Experiments and Tests Planned

It is planned to obtain water-input data on additional wells to determine to what extent tight sands can be selectively acidized, as well as to what extent loose sands can be selectively plugged. Data is available which indicate that good results may be expected and further improvements may yet be made. It appears that considerable improvement in acid treating of the sand face may be made by correctly designed jets for both wash-out and acid injections.

Sufficient data is not yet available to determine if an increase in production will follow the indicated increase in intakes but such data will determine what acidization procedure of input wells, if any, and in what localities it is successful and profitable.

It seems possible that producing wells may also be acidized, but this involves the running of a packer so that the acid can be injected into the sand under considerable pressure and held in place during the acidizing treatment. It is hoped that some experiments may be carried out in producing wells so as to further increase the oil movement through the tight sands beyond that which is now done by selective shooting and old well clean-outs.

Acknowledgments

These experiments were conducted under the general supervision of Richard V. Hughes, Director of Production Research, as part of the Pennsylvania Grade Crude Oil Association research program on secondary recovery. The author is indebted not only to his own staff but also to various lease men and their crews which include: Lem Monroe of Andrus and McDowell; Kenneth Barton of Quaker State Oil Company; Muriel Flanders of Andrus, Lent and Daggett; Cletus Carlson of Wann, Andrus and Gibson; and Ford Ellenberger of Kendall Refining Company.

Reference

"Safety in the Operation of Hydrogen Fluoride Alkylation Plants," U. O. P. Booklet No. 252, Universal Oil Products Company, 310 Michigan Avenue, Chicago.

TABLE 1

Wells Experimentally Acidized

(Each Horizontal Line is a Separate Acidization Treatment)

Case No.	Date of Last Treatment	ACID AND TREATMENT Gallons HCl	Gallons HF	Time in Hours*	INCREASE IN INTAKE Barrels per Day Before Treatment	Barrels per Day After Treatment	Length of Time Observed
1	10/1/44	12	..	7 (15) 7 (15)	10	25	1 year
2	8/4/45	48	10	(48) then washed out	17	70	3 days†
3	1/ 2/46	48W	..	(48) then washed out			
		48W	10	6 then washed out	6	18	6 months
4	4/ 4/46	48W	..	(48) then washed out			
		36	10	7 (15) then washed out	9.5	29	2 months
5	4/25/46	48W	..	(48) then washed out			
		48W	..	7 (15) then washed out			
		48W	10	7 (15) then washed out	12.5	29	2 months
6	5/31/46	48	10	1 48 then washed out			
		48	10	2 (2 to 16) etc. then washed out	5	8.9	17 days
7	5/25/46	72W	10	(48) then washed out	8	8	.....
8	6/ 4/46	72W	10	2 (2 to 16) etc. then washed out	8	18	2 weeks
9	6/27/46	72	10	2 (2 to 16) etc. then washed out			
		72	10	2 (2 to 16) etc. then washed out			
		60W	10	2 (2 to 16) etc. then washed out	6	..	Not gauged Yet

* Bold-face numbers indicate time under lease pressure. Parenthesis around numbers indicates time under hydrostatic pressure. Thus 7 (15) 7 (15) means 7 hours under pressure alternated with 15 hours shut-in, 7 hours pressured and 15 hours shut-in.

† Water profile showed inverse selectivity; therefore, the well was selectively plugged to 28 barrels per day. W—Wetting agent Igepal CA Extra added 40 ml. per each 12-gallon carboy. HCl is 30% Inhibited Muriatic acid (Duclean No. 2). HF is 50% Hydrofluoric acid.

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ACCOUNTING FOR *Profits* ON DRILLING CONTRACTS

By H. O. REYBURN, C.P.A.,
Nicholson, Reyburn & Traweek, Tulsa

HOW soon can I tell what my profit is on a contract after it is completed? This has been asked more often by drilling contractors than almost any other question relating to accounting. Very few have ever received the answer they wanted because they generally receive the reply that all of th bills won't be in for 30 or 60 days and the final answer cannot be determined until that time.

Realizing the need for a more satisfactory answer with relation to contracts in progress or completed, the author devised a plan as a supplement to the accounting records which would satisfy this need. The supplement shows, with reasonable accuracy, the profit status of a drilling contract at all times within a few days of the time the work is performed. This system was placed in operation by one company and has proven very satisfactory for 18 months. The plan is not a substitute for accounting records, but a supplement to them, and the time required to keep it up to date for a company having five rigs or less does not amount to more than one hour per day for one man.

The first step is to set up an accounting system that will yield complete information concerning operating costs, not only by contracts but by rigs.

The next step is to set up an income and expense sheet for each contract as shown in Figure 1. This contract sheet is not a part of the regular accounting records, for it contains some averages in lieu of actual costs. It will, however, come so close to the actual net profit on a contract that it is more useful than the actual accounting records where competition is keen and drilling is active. The form may be put on 18-column work paper or printed to fit in a post binder. The work paper placed in file folders, one folder for each contract, has proven very satisfactory because the arrangement lends itself to an easy comparison of similar contracts.

Let us take each item as it appears in Figure 1 to determine the source of information.

Date:

The date is the one shown on the drilling report which reports the progress of the well.

Remarks:

This space is provided for a brief explanation of what was being done; for example, drilling, fishing, taking drill stem test, etc. The information comes from the daily drilling report.

Depth:

The depth is that shown on the drilling report at the end of the day.

Earnings:

Today:

The earnings for the day are determined by multiplying the footage drilled by the price per foot, making proper allowance for time, if any, at the day work rate.

To Date:

In this column is the cumulative total of the daily earnings which is verified from time to time by multiplying the total footage drilled by the price per foot and adding the day work charges reflected in the separate postings.

Total Expenses:

Today:

In this column is the cumulative total of the daily expenses appearing in the following column.

To Date:

Total expenses today is the total across of all the items listed for that day in the other columns to the right.

Labor:

The amount posted in this column is determined from the drilling reports. The drilling report will show who worked and the job classification of each. Payroll rate tables make this computation of labor costs for the day fairly simple. To the cost so determined is added workmen's compensation and public liability insurance and payroll taxes. This is made fairly simple by adding all of these rates together and multiplying the rate by the applicable labor cost; for example:

Workmen's compensation	$ 6.450
Public liability	.178
Property damage	.224
F. O. A. B.	1.00
State unemployment	2.70
Federal excise	.30
Total per $100 of payroll	$ 10.852
Total payroll today	$160.00
Payroll taxes and insurance @ $10.852	17.36
Total labor cost today	$177.36

Only the payroll tax rate is applied to premium time.

If a mileage allowance is being made, it will also be included in this column, as the miles driven each day are shown on the drilling report.

No special consideration is given to the fact that some employes may have earned more than $3000 in the year to date, for the purpose of computing the payroll tax charges. Such adjustments are too minor to warrant the extra work involved to make them.

All labor on the sixth and seventh days is computed at time and a half unless all crews are new and it is known definitely that none of the employes have worked more than 40 hours during the work week. On the average, the premium time computed for occasional new employes on the sixth and seventh days, under the procedure outlined above, is offset by the overtime resulting from "doubling up" of old crew members to fill temporary vacancies created when crew members leave.

Rock bits and cones:

The number in the first column is the contractor's number, which, together with the size of the bit, is taken from the drilling report.

The serial number is the manufacturer's serial number, which is stenciled on the bit and its posting to this record is the basis for checking invoices for bits before they are paid.

Trucking:

Trucking invoices should be entered as soon as received. Entry on the daily cost sheet should never be postponed until an invoice is paid.

Tool rental, derrick, mud, etc.:

These costs vary by wells, so they must be given individual consideration. These costs are entered as soon as the invoices or charge tickets arrive in the office. If the exact amount is not known, an approximation is made which is later adjusted when the invoice arrives. Tool pushers must assist on these items by forwarding drilling reports and delivery tickets promptly. A tool pusher knows what the minimum rental is on rented tools and he should make certain that rental terms are on the delivery ticket before he forwards it to the office.

Derrick rental terms are known when the derrick is erected, and the minimum rental should be entered on that day. If contractor's own derrick is used, then daily costs determined from experience should be entered.

Mud costs can be entered either from the information shown on the drilling reports or from delivery tickets.

Water costs, if any, should also be entered in this column.

Tool pusher's salary and expenses:

Average daily cost of tool pusher's salary and expenses is entered in this column. If tool pusher is looking after two rigs at the same time, then half of the average daily cost is posted on each contract.

Fuel, repairs and indirect costs:

This item is determined from experience and the daily charge is posted to the expense sheet from the day rigging up begins until tearing down is completed except in the case of unusual delays.

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ABC Drilling Company

Well - Jones Ranch #2 — Contract #147

Operator - A Oil Company — Rig #2

Date 1946	Remarks	Depth	Earnings Today @ 4.00 per ft.	Earnings To Date	Total Expenses To Date	Expenses Today	Labor, P.R. Taxes, Ins. etc.	Rock Bits Co. No.	Rock Bits Size
Aug 4	Dig cellar, level location and rig up				53619	53619	16019		
5	Rig up - build derrick				320479	266860	19260		
6	Rig up				360084	39605	17005		
7	Rig up				402663	40579	17979		
8	Rig up, drlg, & reaming	320	128000	128000	474668	74005	19041	1	12 1/4
9	W.O.C. - Replace drlg. line	320	-	128000	524372	49704	27104		
10	Drilling	1050	292000	420000	590526	66154	27104	2	8 3/4
11	"	1862	324800	744800	781776	191250	19090	3	8 3/4
12	"	2503	256400	1001200	838804	57028	17978	4	8 3/4
13	"	2958	182000	1183200	896895	58091	19041	5	8 3/4
14	"	3150	76800	1260000	962794	65899	18067	6	8 3/4
15	"	3303	61200	1321200	1008841	46067	18067		
16	"	3560	102800	1424000	1074796	65955	26905	7	8 3/4
17	"	3761	80400	1504400	1140751	65955	26905	8	8 3/4
18	"	3905	57600	1562000	1208244	67493	17393	9	8 3/4
19	"	4016	44400	1606400	1266335	58091	19041	10	8 3/4
20	"	4085	27600	1634000	1323426	56991	19041	11	8 3/4
21	"	4173	35200	1669200	1397332	74306	19041	12	8 3/4
22	"	4277	41600	1710800	1453049	55717	18067	13	8 3/4
23	Drlg, Electric Log (6 hrs), run casing	4905	15000 112000	1737000	1520854	67805	26905	14	8 3/4
24	Tearing down	4905	-	1737000	1558428	37574	16374		
25	" " and moving	4905	-	1737000	1598397	39969	11619		
	Totals		1737000	1737000	1598397	1598397	437046		
	Net profit			138603					

Note:
Contractor was lucky on this job. Two days of fishing would probably have wiped out all profits.

Items included are as follows, determined separately for each rig:

Rigging up material (special consideration must be given when changes in locality occur)
Oil and lubricants
Supplies
Pump repairs
Other repairs and replacements
Insurance
Small tools
Wire lines
Fittings
Drill pipe protectors
Watchmen and storage
Miscellaneous
Fuel

Each time a contract is started, consideration must be given to the items here included so that any items furnished by the well owner can be eliminated and adjustment can be made for the type of fuel being used, i.e., butane, diesel oil, or natural gas.

The advantage of averaging these items is that they consist of numerous small charges and that there is always a carry-over from one well to the next of such items as oil and lubricants, supplies, wire lines, repairs, etc. The repairs here included are repairs having an estimated useful life of less than one year or repairs of less than $500, even though they might last more than one year. Major overhauls should be charged to depreciation reserve and charged off to operations through the depreciation provision.

Drill pipe depreciation:

The charge for drill pipe depreciation is based on experience for given areas. Occasionally, it will be necessary for a contractor to use the experience of others or make a guess, but this must be done to arrive at the net profit on a job regardless of the accounting system involved. For example, in Eastern New Mexico and West Texas, a new string of 4½-inch drill pipe may be expected to last approximately 200 operating days on wells deeper than 5000 feet. Each day, therefore, that the drill pipe is used in the hole, a charge would be made to the cost sheet for that day of 1/200 of the new cost of the string.

Drill pipe investment and depreciation is kept best by strings, in the writer's opinion. There are certain to be transfers from one string to another, and when this is done the applicable investment and reserve should also be transferred. Depreciation for the entire string should be charged for each day the pipe is used because, as a rule, when pipe is laid down, the entire string is laid down at one time, not just a few joints at a time. The exceptions to this rule are very few for new pipe is seldom mixed with old pipe to make up a complete string. For this same reason a portion of a string of pipe transferred from one string to another should take on the depreciable life of the string to which it is transferred.

Rig depreciation:

The charge for rig depreciation is on a day basis, and should be charged from the day rigging up starts until the day tearing down is completed, except where unusual delays occur in rigging up or tearing down.

In order to estimate properly rig depreciation, investment in tools should be controlled by rigs; transfers should be made at condition values; and major repairs and replacements should be charged to depreciation reserve. Some companies follow the practice of charging repairs and replacements costing in excess of $500 to depreciation reserve,

FIGURE 1

Bits and Reamers Serial No.	Bits and Reamers Cost	Trucking	Tool Rental, Service, Mud, etc. Item	Tool Rental, Service, Mud, etc. Cost	Tool Pushers Salary + Expenses	Fuel, Repairs and Indirect Costs	Drill Pipe (Rig #16)	Rig Depreciation	General Overhead
			Cellar + Pits	15000	2800	10000		6800	3000
			Derrick - Godo	23500	2800	10000		6800	3000
					2800	10000		6800	3000
					2800	10000		6800	3000
41965	17200		Mud	9764	2800	10000	5400	6800	3000
					2800	10000		6800	3000
80011	11050				2800	10000	5400	6800	3000
78544	11050	13310			2800	10000	5400	6800	3000
78563	11050				2800	10000	5400	6800	3000
79052	11050				2800	10000	5400	6800	3000
79101	11050		Mud	8762	2800	10000	5400	6800	3000
					2800	10000	5400	6800	3000
79110	11050				2800	10000	5400	6800	3000
79119	11050				2800	10000	5400	6800	3000
79413	11050								
79419	11050				2800	10000	5400	6800	3000
79426	11050				2800	10000	5400	6800	3000
76104	11050				1400	10000	5400	6800	3000
76119	11050	1761.5			1400	10000	5400	6800	3000
85329	11050				1400	10000	5400	6800	3000
			Csg Crew	17000	1400	10000	2700	6800	3000
					1400	10000		6800	3000
		7150			1400	10000		6800	3000
	160850	157875		275526	53200	220000	78300	149600	66000

except for replacements of wire lines, rotary hoses, and drill pipe. This has proven very satisfactory and eliminates confusion in the accounting department in attempting to distinguish between major and minor repairs in relation to the unit being repaired.

Depreciation should be provided for under normal operating conditions on the basis of contract days. For example, in the experience of one operator operating a rig costing approximately $75,000, exclusive of drill pipe, the applicable depreciation rate per contract day was determined to be $61.64 per day as follows:

Original cost	$75,000.00
Provision for salvage	7,500.00
Net amount subject to depreciation	$67,500.00
Expected life, exclusive of repairs	1095 days
Depreciation rate per day	$ 61.64

While only 1095 days are used in arriving at the depreciation rate per day, it will take approximately 2000 days to fully reserve the investment due to charges against the reserve account for major repairs and items replaced over the life of the rig. Under ordinary conditions, 2000 contract days represent eight years of operation.

The advantage of this method of depreciation over straight line depreciation, for accounting and tax purposes alike, is that the depreciation plus major repairs are charged off in proportion to the work performed. On the straight line basis, the same amount of rig depreciation was charged off in 1945 as was charged off in 1941, and in some cases the work performed in 1945 was almost twice as great as that performed in 1941. The result is a distorted net profit both for accounting and tax purposes, and the resulting tax cost in many cases has been very high. Some companies using the straight line method of depreciation use a low rate of depreciation and charge all repairs to expense. This further distorts the net profit from operations because there will be very little repair expense during the first two years of operation and in the last three years of rig life, the repairs will almost equal the depreciation provision. The result is that twice as much depreciation plus repairs are charged to operations, when the rig is half worn out and its earning capacity is reduced, than is charged when the rig is new and its earning capacity is high.

Major repairs and depreciation are inseparable and should be provided for together, as suggested above. For example, an engine overhaul restores to an engine the operating efficiency it has lost through wear and tear from the date it was new or last overhauled until the present overhaul became necessary. It is as much an investment in equipment as the original purchase price and should not be charged to one contract or to any one year except as provided for through depreciation.

Some items of equipment require more repairs than others and some will have to be replaced completely during the life of a rig. All such items are taken into consideration in arriving at the composite rate of depreciation per contract day computed above. A composite rate, considering the rig as a unit, less drill pipe and drilling derrick, is more practical than a separate rate for each class of equipment. A breakdown by classes of equipment makes allocations of depreciation to jobs more complicated and burdensome, and if both are properly computed, the result is the same, any-

■ CONTINUED ON PAGE 89

Clay Research

AND OIL DEVELOPMENT PROBLEMS

By DR. J. C. GRIFFITHS
Trinidad Leaseholds, Ltd.

THERE are two fundamental methods of approach to the problem of maintaining or augmenting oil reserves, the first demands geological exploration to discover new oil fields, whereas the second is based on increasing the recovery efficiency in fields already under production. In either case the increasing difficulties of locating new oil fields or of producing more oil from those already found demand a more detailed knowledge of the reservoir rocks and their environment. Within this field of research the petrography of sedimentary rocks reigns supreme, and only by diligent pursuit of this subject can any spectacular advances be envisaged.[26]

According to Clarke,[5] the lithosphere comprises 95 percent igneous and 5 percent sedimentary rocks; of the sedimentaries 80 percent is assigned to the shales and clays, 15 percent to the sandstones, and 5 percent to the limestones. It is the purpose of this paper to outline the signiffcance of the clay materials in the problem of oil exploitation and production.

Clay Mineralogy

The extent of the development of the subject of clay mineralogy during the last decade is well illustrated by the comparison of Boswell's account[3] of the mineral composition of clays (1933) with that of Grim and his coauthors (1942).[11] Similar advances have been made in knowledge concerning colloid chemistry and base exchange, and the literature dealing with the different aspects of clay has therefore become overwhelming. Before considering the application of these studies to oil-development problems it is necessary to summarize the main facts concerning the composition and behavior of the commonly occurring clay minerals.

The most recent views[11,27] on the composition of clays suggest that they consist essentially of mixtures of two or more of a few mineral groups with or without some quartz, feldspar, and rare "heavy minerals." The commoner clay mineral groups are:

Kaolin Group: This group includes the minerals kaolinite, dickite, and nacrite, which are complex aluminium silicates of the type[11]

$$(OH)_8Al_4Si_4O_{10}.$$

The valency requirements are completely balanced within the structure, and there is little tendency for replacement of the aluminium by iron, magnesium, etc.; kaolin minerals are therefore the most stable clay minerals.

Montmorillonite-Beidellite Group: These minerals are also complex silicates of alumina, but with lower alumina-silica ratios than those of the kaolin group. The general formula is given by[11]:

$$(OH)_4Al_4Si_8O_{20} \cdot nH_2O.$$

In this structure there is a tendency for ions of lower valency to replace both the aluminium and silicon, leaving unbalanced charges which are neutralized by such bases as sodium, calcium, magnesium, etc.

Illite Group: The illite group is not so well known as the previous types, but many prove to be one of the commonest clay minerals; it is assumed to be the fundamental factor in producing shaley structure in many of the finer-grained rocks. Its general composition is given as[11]:

$$(OH)_4K_y(Al_4Fe_4Mg_4Mg_6)(Si_8 - _yAl_y)O_{20}.$$

Its replacement behavior varies, some forms of illite approaching the montmorillonite-beidellite types, readily undergoing base exchange, while others are more stable and resemble the kaolin group. This has led Grim[10] to suggest that the illite group may constitute an isomorphous series analogous to that of the montmorillonite-beidellite minerals.

Other Clay Minerals: Many other clay minerals exist, but are less well known, and in most cases comparatively restricted in occurrence. Saponite, nontronite, hectorite, attapulgite, halloysite, and allophane are examples. The first three are end-members of the replacements, by various bases, of aluminium or silicon in the montmorillonite or beidellite group. Attapulgite appears to be a representative of a new group, while halloysite is related to the kaolin group, but shows some properties more allied to montmorillonite. There is some doubt whether allophane is an amorphous clay mineral or a mixture of silica and alumina, etc.

Derivations of the Clay Minerals: The genesis of the clay minerals has been attributed to various agencies. Kaolinite is considered to be formed, when in bulk, by the hydrothermal decomposition of granitic materials; montmorillonite-beidellite minerals are characteristic of the rock called bentonite, and are there formed by decomposition of volcanic ash. Illite probably plays its biggest role in the older rocks where diagenesis has already commenced to reconstitute the clay material along the sequence of changes which lead to the development of various mica minerals, and in which illite appears to play a role intermediate between many clay minerals and the micas.

Within recent years evidence has accumulated which suggests that kaolinite and montmorillonite may be formed from similar parent materials and that their respective development depends on the existence of an acid or alkaline environment, which in turn depends on the presence or absence of intensive leaching.[27] Illite may arise under somewhat similar conditions in the presence of potassium ions.

Physical and Chemical Behavior of the Clay Minerals

The physical and chemical properties of the clay minerals are largely dependent on the stability of the lattice structure, and some account of this is necessary before considering the questions of base exchange, water adsorption, etc., in relation to the effect of clay minerals on production problems.

Lattice Structure of Clay Minerals: The details of the lattice structure of the clay minerals have been usefully summarized by Hendricks,[14] the most outstanding feature being their layered character. This leads to the mica-like outward form of many of the clay minerals which are generally described as platey.

The kaolinite-type lattice is relatively stable, and this is considered to be due to the juxtaposition of H^+ and ^-OH groups in the successive units which build up the crystal. The lattice of the montmorillonite type, on the other hand, is relatively unstable, and this is explained as due to the proximity of ^{--}O atoms in the adjacent units. In illite the repelling charges of the oxygens of the montmorillonite lattice units are in part neutralized by a base, generally potassium, and so the illite lattice, although less stable than the kaolin type, is more stable than the montmorillonite type.

Water Adsorption: All clays adsorb water to some degree, a characteristic related to the large surface area of an aggregate of small particles. However, the different clay minerals show considerable variation in the volumes of water which they can absorb.

Kaolinite shows this effect in the least degree, while illite is intermediate, some illites adsorbing relatively large amounts, whereas others approach the kaolinite type in this respect. Montmorillonite, however, is the most striking, adsorbing very large amounts of water. It has been reported[28] that a cube of montomorillonite-type clay can, without loss of shape, increase its volume 13.8 times by adsorbing water. This property is ex-

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tremely important in oil-development problems, and the presence or absence of the adsorptive minerals is of fundamental importance in reservoir technology.

The adsorption of water in montmorillonite is related to the base-saturated nature of the particular mineral.[10] In general, sodium clays carry the most water, calcium and magnesium clays less, and hydrogen clays least. In addition, the particle size of the clay mineral affects the water adsorption, and the characteristic small size of the montmorillonite-beidellite types and their tendency to extreme dispersion in the presence of water tend to favor a high adsorption.

Clay minerals lose water on heating, and the thermal dehydration curves are characteristic of the different mineral groups.[12]

Base Exchange: Base exchange is a stoichiometric exchange of ion for ion in the crystal structure and is best shown by montmorillonite, wherein bases such as Na^+, Ca^{++}, Mg^{++}, and H^+ can replace each other within the mineral without destroying the lattice structure. This property depends essentially on initial replacements within the lattice of a tetravalent by a trivalent ion, etc., leaving an excess charge which is neutralized by a suitable base ion such as Na^+ or K^+.

The order of base replacement is given as follows:

$Li^+ > Na^+ > K^+ > Mg^{++} > Ca^{++} > Ba^{++} > H^+$.

Thus at equivalent concentrations calcium will displace sodium, etc., although it has been pointed out that each mineral group may have its own order of base replaceability, dependent on size of cavity in the lattice and ionic size of the replacing ion. This phenomenon is of importance in oil-development problems because of the practicability of replacing unfavorable by favorable ions on introducing simple solutions.

Base-exchange capacity varies within the clay minerals, montmorillonite once more proving to be the most highly reactive. In addition, base-exchange capacity increases with decrease in grain size. The relative degree of base-exchange reaction is given in Table I.

The nature of the exchangeable base saturating the clay mineral determines the characteristic properties of the mineral within its group, but it must be emphasized that more than one base may be present. Hence the following discussion is relatively simplified, in order that the general behavior of clays commonly met with may be outlined and their particular applications suggested.

Hydrogen-Base-Saturated Clay: Hydrogen-base-saturated clay originates as a surface deposit in regions of high precipitation due to leaching by rainwater carrying carbon dioxide. Its high shrinkage and water adsorption lead to mechanical instability, and landslips are characteristic of areas in which hydrogen clays are a dominant feature. Experimental cures have been attempted using base exchange as the working principle. Hydrogen clay is rarely encountered in oil-development work, but has been utilized in refining oils for "filtering" impurities and improving the color of the lubricating-oil fraction.

Calcium-Base-Saturated Clay: Calcium- and magnesium-base-saturated clays are physically similar and may be considered together. Calcium clay possesses the highest permeability of the commonly occurring types, and because calcium readily displaces many other bases, this is a relatively common subaerial clay. Kelley and Liebeg[15] attribute the dominance of magnesium in the marine clays to the ease with which magnesium enters the base positions of the clay lattice, and it appears probable that calcium clays originate for similar reasons from the migration of calcium-rich ground-waters through clayey sediments within the horizon of the ground-water table.

TABLE 1

Base Exchange Capacity

(After Grim.[11])

CLAY MINERAL	Milli-equivalents per 100 Grams
Montmorillonite	60–100
Attapulgite	25– 30
Illite	20– 40
Kaolinite	3– 15
Halloysite	6– 10

Calcium clay plays its chief part in agriculture, where it is generally considered as the most desirable type for development. A naturally developed calcium clay possesses the quality of tilth —that is, the soil structure is crumbly. The clay is in a flocculated condition, and so allows drainage to and from plant roots with reasonable ease. Artificial development of a calcium clay does not, according to some experts, necessarily lead immediately to a granular texture, but substitution of calcium for sodium generally connotes an increase in permeability.

Sodium-Base-Saturated Clay: This is probably the best-known type, principally because it possesses well-marked properties useful in many industrial capacities. Sodium clay has a greater drying shrinkage than calcium clay. It is in a deflocculated condition and has a high water-adsorption capacity. It is relatively impermeable. In simple qualitative experiments it can easily be demonstrated that whereas sodium clay is permeable to sodium chloride solution, it is relatively impermeable to fresh water. This is the basis of the McKenzie-Taylor theory of the origin of oil and coal. McKenzie-Taylor[20, 21] has shown that many shales which form the cap rock of oil reservoirs are sodium-base-saturated, and on flushing with fresh water had become deflocculated and impermeable, thus providing anaerobic conditions in the sand below. On this basis it appears reasonable to suggest that the clay associated with oil and its accompanying saline waters is sodium-base-saturated, and therefore in a relatively highly peptized condition. Any contact with fresh water tends to develop an impermeable sheath between the fresh water and the reservoir fluids. These inferences, if correct, are fundamental in assessing reservoir performance during oil development.

Application of Clay Research to the Oil Industry

The obvious contacts of clay with oil-development problems principally concern clay and shale in bulk as rock units, and considering the average sand reservoir rock* the question arises: Of what significance is clay? Perusal of the literature on the petrology of reservoir sands as exemplified in the case of the Third Bradford Sand[17] and the Californian Tertiary sands [25] gives direct evidence on this point, while indirectly the presence of clay in the producing sands of the Gulf Coast, Texas, can be safely deduced from the information in a report on mud acidizing.[19]

The Miocene producing sands of South Trinidad all contain a fair proportion (up to 10 percent) of clay fraction, and Muskat[23] states that, as the tendency of natural rocks to suffer hydration is not uncommon, it would be advisable to test for this effect in measuring the permeability of rock samples. It will, then, be understood that, in sand reservoirs, the presence of a small but significant clay fraction is the rule rather than the exception.

The precise significance of this clay fraction will now be analysed, and the order followed has been chosen as nearly as possible in sequence with the broad program of development leading to an economic oil reservoir from the search for the pool to its eventual production.

Exploration: This section is concerned with the purely geological aspect of locating an oil reservoir. Both geophysics and pure geology are employed in the search for oil fields; in the former, measurements are made of differences in bulk properties of the rocks, and their interpretation does not involve absolute knowledge of the effect of clay or any other rock type. Quite clearly, as geophysical methods measure physical properties of rocks and rely on differences in these rocks, any information on the "why" of these measurements would be illuminating. One branch of geophysical observations—electric logging—will be considered later, and many of the problems mentioned in connection with that method of well-logging can also arise in the wider field of geophysical investigations.

From the geological standpoint one of the principal weapons used to elucidate the stratigraphy and structure is palaeontology—the study of fossil faunas which are to a large extent concentrated in clays. The palaeontologist has perforce recognized that the term "clay" includes a variety of materials, and the recent emphasis on facies variations indicates the importance of possessing a second and independent line of evidence for ecological control. Information on the sedimentation of clays would be invaluable in this respect, and Frank[8] in a recent publication uses the proportion of clay minerals to differentiate the different clay types, and from this and other petrological evidence, has reconstructed the palaeogeography of the period represented by the deposits.

There is no doubt that with the growth of knowledge on the origin of clays this line of investigation will develop considerably.

Drilling Practice: The location of favorable "trap" conditions once inferred, the next step is to investigate the formations with the drill. In drilling, the oil industry's contact with clay is most extensive.

One of the most important items on the drilling program is the selection of a suitable shale-base for the drilling mud. Much has been written on this problem, and sufficient is known to provide a useful summary of the necessary characteristics of the material.

The first requisite in a clay suitable for drilling mud is a high colloid con-

*In the following discussion the reservoir rock is tacitly assumed to be a "sand" unless otherwise stated.

tent, and the ideal clay would therefore be a bentonite—that is, the most suitable clay mineral is one of the montmorillonite-beidellite group. This group gives the best dispersion and thixotropic character, for reasons already mentioned. Within the montmorillonite-beidellite group the base-saturated nature of the clay preferentially determines its efficiency. Sodium-base-saturated types are by far the most efficient. This has been adequately demonstrated both in the field and the laboratory, and the general rule is, the higher the colloid content the better the thixotropic character, and the higher the sodium-base saturation the better the dispersion, wall-building, gel strength, etc.

This represents the best approach to the problem of the average drilling mud. Special hazards demand special muds, and here again an extensive literature exists. Nearly all the common problems, such as gas-cutting and cement-cutting, loss of fluid to the formation, viscosity control, wall-building characteristics, etc., can be met by suitable chemical treatment which principally affects the base-saturated nature of the clay mineral and either increases or decreases the dispersion. To take a simple example—a cement-cut mud results from flocculation of the normal sodium-base-saturated mud by calcium ions, and the corrective is to return to a sodium-base saturation by increasing the concentration of the sodium ions in the fluids—for example, adding sodium phosphate or tannate.

The normal shale-base muds of 70-80 pounds per cubic foot give place to the barite-weighted muds (100-130 lb./cu. ft.) when high formation pressures are expected or encountered, and this is an expensive change. It is generally accompanied by the addition of a natural bentonite specifically treated for use in drilling mud. Once again the most effective type is a sodium-base-saturated bentonite (montmorillonite-beidellite group).

One of the most difficult drilling problems which still remains to be satisfactorily solved is the safe penetration of "heaving shale." The term "heaving shale" has been used for a number of phenomena, but recent literature[1] tends to reserve the term for swelling and sloughing formations in which the swelling and sloughing are physico-chemical effects developed by contact with the fluids from the drilling mud. Baker and Garrison have analyzed this problem[1] and suggested that it was due in part at least to laminated formations in which the alternate laminae are sodium- and calcium-base-saturated clays, the former swelling and disintegrating into the mud stream, the latter sloughing off in lumps and causing sticking of the pipe. Here the cause of the trouble is attributed to bentonitic-type shale—that is, to the montmorillonite-beidellite clay mineral group.

A silicate/brine mud has been used to counteract this effect, but has not proved entirely satisfactory, and is moreover expensive and difficult to handle, particularly if it is necessary to use heavy muds. The latest suggestion, not yet tried in the field, is the use of positive colloid muds,[2] which from a theoretical viewpoint would appear to provide a satisfactory solution.

Briefly, the normal mud behavior is attributed to the negative charge associated with the clay micelle in the ionized mud. Conditions which lead to the optimum development of this ionization result in similar effects on formation clays liable to heave, and hence Bond suggests using a positive colloid mud to prevent the formation ionization. Basic dyes added to normal bentonite solutions result in the development of a positive colloid mud and act as neutralizers of the negative charge on the formation clay, thus removing the cause of formation swelling and heaving.

TABLE 2

Grain-Size Analyses of Some Miocene-Producing Sands of Trinidad

Grade Scale	SAND		SILT		
	Fine	Very Fine	Coarse	Fine	Clay
Microns	250–125	125–62.5	62.5–15.6	15.6–3.9	3.9
Sample	Percent by Weight				
1	12	65	14	2	7
2	11	69	14	2	4
3	11	61	14	5	9
4	11	51	22	6	10
5	26	52	11	5	6

This does not by any means exhaust the contacts of clay with drilling procedure, but enough has been stated to show the outstanding importance of a thorough knowledge of the raw material, clay, in this section of oil development.

Completion Procedure: After passing through the hazards of drilling to the reservoir rock and successful location of a "pay horizon," the next step is to obtain an electric log of the formations exposed in the hole and decide on the completion program. Electric logging will, however, be considered in a succeeding section. The actual "completion" is a problem which, while satisfactorily executed in the average case, has rarely been subjected to a rigorous scientific control.

It has already been mentioned that washing a sodium-base clay with fresh water leads to the development of an impermeable sheath between the fresh water and the formation fluids, yet this is, in general, the basis of at least one commonly used completion method known as washing the well in. The deleterious effects of this method have been emphasized in a recent article on the use of different completion fluids in certain Californian fields.[7] Reduction in rates of flow, and even total loss of production in some cases, has been attributed to washing the "pay" with "sweet water" (fresh water). There is little doubt that this practice has had similar effects in many fields, where other factors, of which there are many, have been invoked in explanation. Indeed, if it were not for the high pressures generally associated with oil-bearing formations it would be surprising that any fluid should be produced at all after such harsh treatment.

The main problem at issue here is dependent on the composition of the reservoir rock. Limestone reservoirs and "clean" sand types are rarely affected, whereas the average reservoir sand containing a clay fraction which is almost certainly in equilibrium with the interstitial fluid, and is, therefore, sodium-base-saturated, would give a very definite reaction to such a procedure and is hardly likely to give a favorable one. Such practice usually results in the well not "coming in," and the general cure is to resort to swabbing and bailing to increase the pressure difference between formation and hole. The later history of such wells often contains reference to "sand trouble," and in the extreme of collapse of formation and/or casing. The alternative appears to be theoretically simple, in that the use of suitable chemical solutions not necessarily concentrated should prevent the formation of an impermeable "halo," and would in all probability, if properly constituted, result in cleaning the walls of the hole.

The second major problem which has been frequently noted in completion procedure is the "mudding off" of the producing formation. This term covers all degrees of trouble, from mud-cake on the walls of the hole to actual invasion and choking of the pores of the sand. The purely mechanical cure is the wall scraper or under-reamer, which, however, can only be effective in the simplest cases. A more drastic treatment is mud-acidizing, which is of wider application.

The composition of "mud-acid" is still a trade secret, but the fluid is specified as dissolving clay minerals and even quartz to some extent.[4] This process necessitates an inhibitor, and often a de-emulsifier among other rather expensive complications involved in the use of the acid. It would again appear simpler to discover the exact nature of the material causing the trouble—supposedly a clay—and treat the clay with a simple chemical solution to reduce the choking effect. In the majority of cases where the obstruction to flow is the drilling mud the clay is a sodium-base-saturated montmorillonite-beidellite; the cure would then appear to be the use of a solution of calcium or magnesium chlorides strong enough to exchange the calcium for the sodium, and so increase the permeability of the material. Such solutions should be cheaper and easier to handle and should obviate many of the complications resulting from the use of mud-acid.

A similar and allied problem is the choking of a gravel pack which is primarily used to prevent "sand trouble." It has been determined experimentally that the grain size of a gravel pack should be 11 to 13 times the 10 percentile grain size of formation sand for efficient operation. The 10 percentile grain size of formation sand has similarly been found to be the critical size sufficient to cause bridging within the formation, and so prevent formation sand from passing into the casing. Bridging depends essentially on the uniformity of the sand-grain size-distribution—that is, sufficient material must be present in all grade sizes below the 10 percentile to build up in the formation, adjacent to the well-bore, a bridge consisting of grains of increasing fineness. While this uniformity may exist in the average case, the grain-size analyses, quoted in Table 2, exhibit a very low frequency for material in the fine silt grade.

The "critical ratio of entrance" of a sand made up of uniform spheres in closest packing is, according to Fraser,[9] $0.154D$, where D = the diameter of the spheres. Hence in the sands quoted, taking 62.5 microns as the uniform diameter, and assuming the grains to be spheres under the conditions prescribed, the critical ratio of entrance is 9.6 mi-

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crones. It will be noted that this diameter occurs within the range of the fine silt—that is, in the grade with the least percentage of material—and hence it appears probable that the material finer than 9.6 microns may fail to bridge on sands of 62.5 microns diameter or larger.

Hence, in using gravel packs on certain formations the probability is that the clay fraction would either choke off the pack or be produced with the oil. In areas with which the author is familiar an insufficient number of trials have been made for a decision to be reached with regard to the cause of gravel pack failures.

Electric Logging: Electric logging is one of the most important techniques employed in oil development. Interpretation of the log quite frequently determines the completion program for a well and, insofar as the development of the field as a whole is concerned, correlation based on electric logs is of considerable value.

The electric log comprises two separate sets of curves which represent measures of electrical properties of the formation under conditions that occur in a bore-hole. The curves are designated the self-potential (or S.P. curve) and the resistivity (or R. curve), and are considered to reflect composition ("porosity") of the formation and the nature of the contained fluids respectively. Literature on the exact nature of the electric log is not extensive, and some of the recent publications are not inclined to clear the issue. Guyod[12] has followed the view generally held, that the S.P. log is chiefly a measure of the secondary effects—electro-filtration and electro-osmosis—rather than an inherent formation property, but this is questioned by Dickey.[6] Nevertheless, it would appear that as the S.P. log obtained in a dry hole is similar to that obtained in a hole filled with fluid, the S.P. curve is a measure of a lithological property, and the secondary effects of electro-filtration and electro-osmosis essentially modify the "kinks" on the curve.

It may be further deduced from Dickey's paper and a subsequent article by Mounce and Rust[22] that the S.P. curve is a measure of the electrical charge on the clay, and is related to the ionization of the base-saturated clay mineral. Before the significance of the S.P. curve can be satisfactorily elucidated much more must be known of the physico-chemical properties of the formation clays.

The general interpretation of the S.P. curve is based on the relative difference in potential between the clay and the sand, and is empirical— that is, the curve is a measure of the difference in potential between clay and some other material—but it is not necessary that the latter should always be sand, although it can be shown to be so in the average case by coring the formation. Experimental support is found in the fact that in the average case the sand gives a negative value compared with the clay, and indeed the introduction of a small amount of clay into a sand tends to subdue this relative difference considerably. Hence the basis of the interpretation of the S.P. curve is not entirely secure, and its eventual elucidation is evidently bound up with the formation composition, and particularly that of the clay fraction.

Similarly, the nature of the R curve is not clearly defined, but is interpreted as a relative measure by comparison with a fixed standard such as a salt-water sand—that is, the resistivity of an oil sand is larger than that of a salt-water sand. This appears to be a fairly safe interpretation, but is again empiricial, and even with a more accurate approach, such as that attempted by Guyod,[12] the number of nonresolvable factors renders the analysis qualitative in the extreme.

In particular, the R. curve cannot alone decide whether an oil-sand will be an economic producer or not. One of the more obvious questions is connected with the effect of the intersitial water. Water can occur in a formation in at least four fundamentally different states, as follows:

A. Pore water;
B. Adsorbed as a layer around the grains;
C. Water of hydration, principally of clay minerals;
D. Water of constitution of the clay minerals.

Pore water may be termed free water, and is that produced from an aquifer and, in an oil-sand, is the water sometimes produced with the oil. It is directly related to the porosity.

Adsorbed water is that fluid which exists as a thin sheath, generally continuous, on the particles of the formation. The proportion of adsorbed water is much larger in a fine than a coarse sand, due to the increased surface area per unit volume in the case of the former.

Water of hydration is the water that the clay mineral contains when in equilibrium with its environment. It can be large in amount when the clay mineral belongs to the montmorillonite-beidellite group; it also varies with the base on the clay, and is largest for the sodium ion.

Water of constitution is the water which is released from a clay mineral at relatively high temperature (>300° C.), and which may therefore be neglected, as such temperatures are never met with in the environment of an oil-sand.

In actual production, if all the water is present as *c* and *d* it will not flow from the sand; this is, of course, an extreme example, but differences in water content of a formation can be considerable without affecting its oil production. It appears unlikely that the R. curve can distinguish between all these states, and here again knowledge of the clay mineral and its environment would assist in evaluation of these different factors.

Reservoir Technology: In recent years this branch of oil field development has been almost exclusively the field of the physicist and engineer, and core-analysis data form the basis for studies of reservoir behavior, estimates of reserves, and secondary recovery projects. In general, experiments dealing with reservoir technology aim at the determination of the porosity, permeability, and saturation of the reservoir rock.

It must be obvious that there are two fundamental factors at the basis of all these studies—namely, the composition of the reservoir rock and the composition of the fluids. The fluids have been studied in some detail, but the reservoir rock has not received attention except in a few isolated examples.[16, 17, 18]

It is necessary, therefore, to consider the part played by the clay fraction in studying the porosity, permeability, and saturation in relation to reservoir technology.

Porosity: In order to predict the behavior of reservoir fluids, a laboratory test must be able to reproduce the results found in practice, and the most obvious method is to design the laboratory test so as to duplicate as nearly as possible conditions in the field.

The standard methods of measuring the porosity, for example, commence with the core sample dried, a condition never found in practice. As a result, the clay fraction occupies the smallest possible space, whereas it occurs naturally water-wet, in equilibrium with the interstitial fluids, and therefore occupies a much greater volume of the pore space. The porosity figure generally obtained is one near the maximum, and the amount of variation of the true porosity from that measured will depend essentially on the nature and amount of clay material.

Permeability: A similar criticism to that levelled at porosity determinations can be developed for the methods of permeability determination, and here the effect is probably even more marked and the results more misleading. As mentioned by Muskat,[23] the permeability of a core to water may be very different from that to air, and it must be realized that the use of dry air on a dry core sample will once more give a maximum value which may never be approached under reservoir conditions, and which is therefore hardly representative.

In addition to this fairly obvious criticism, which it must be admitted was clearly recognized by Muskat,[23] the use of water, either "fresh" or distilled, is liable to vitiate the results because the flushing of a sodium clay with fresh water results in a maximum dispersion and swelling and the reduction of the permeability to zero in some cases.* The phenomenon, emphasized by many investigators in measuring permeability, of the core gradually choking, or showing a slow decline in permeability with time, is perhaps due to the gradual hydration of the clay minerals, and perhaps also due to base exchange with a solution with which the rock is not in equilibrium. This must be a very important factor in determining the effectiveness of induced water drive, repressuring by returning fluid to the formation, and secondary recovery by water-flooding.

For example, Pfister and McCormick[24] observed that although 10 percent brine solution is more viscous than fresh water, the brine enters the sand more readily than water, and they attribute this effect to the "shrinking" of the clay between the sand-grains on contact with brine.

Hence, it appears indisputable that to obtain a reliable figure for the permeability of a reservoir rock, which is to be any reflection of reservoir behaviour,

* Since this paper was written the deductions regarding changes in permeability of sands to different fluids have been in part confirmed by experimental work with air, water and sodium chloride solution, using rocks from Californian oil reservoirs (N. Johnston and C. M. Beeson, "Permeability of Reservoir Sands," Petrol. Tech. (A.I.M.M.E.), Tech. Publ. 1871, May, 1945).

some liquid must be used for measurement.

A profitable field of research is therefore indicated in testing the permeability of the reservoir rock to different solutions, and this should lead to some measure of permeability control. Solutions could no doubt be designed to increase the permeability of the formation adjacent to the well-bore by, for example, reducing the clay mineral to its smallest possible proportions. These investigations would also prove significant in induced water-drive by injecting through down-flank wells solutions which can penetrate the less permeable sections of the formation and release more oil after primary recovery has reached its economic limit. Secondary recovery by liquid drive must encompass work along these lines if the project is to become a success.

Saturation: The oil content depends on the pore space and on the relative proportion of the fluid in the gas, oil, and water phases, and it has already been suggested that water may exist in the reservoir in many different states in relation to the clay. For example, it has already been observed that the finer the sand, the higher the water-saturation can be without rendering the rock unsuitable as an economic oil-producer. Similiarly, the more adsorptive the clay, the higher the water-saturation may be before interfering with the oil production. Hence it can be envisaged that in a clayey sand where the clay is a sodium-base-saturated montmorillonite type the water saturation of, say 30 percent may be resolved into, bound water 10 percent, adsorbed water on all the grains other than clay 10 percent, and pore water 10 percent. Hence a single figure for water-saturation which neglects the exact function of the water in the reservoir rock can again be very misleading. Inasmuch as the water-saturation figure in common use in core analysis is used to fix that of the oil and gas, such an inaccuracy can give an entirely false aspect to the estimation of oil reserves and oil productivity.

Once again, therefore, it appears fairly obvious that reservoir rock composition and, particularly, the nature and amount of clay, play a vital role in reservoir behavior. Indeed, it must be emphasized that physicists clearly recognize this by stating that their laws of behavior apply to an "ideal reservoir"—made up of non-reactive spehircal bodies.

Conclusion

This review has attempted to indicate the various contacts of clay with oil-development problems, and it must be emphasized that the treatment is necessarily brief, because each facet of the problem represents a considerable field in itself. It can readily be seen that there is hardly a step in the development of an oilfield which does not involve clay in one way or another, and there can be little doubt that some of the most urgent and difficult oilfield problems will not be solved without clay research.

It must also be emphasized that this discussion of clay is but part of a larger problem—the study of the entire composition of the reservoir rock, an aspect of oil development which has been neglected. It appears strange that studies of source rocks, general geology, palaeontology, composition of the reservoir fluids, and behavior of those fluids, should all have received their share of attention, but that the reservoir itself should be considered as an unimportant passive bystander—sometimes referred to as a "stock-tank"—in all this desire to get the most oil quickly and cheaply.

Acknowledgements

The author wishes to thank the Directors of Trinidad Leaseholds, Lt., for permission to publish this article, which is essentially the results of studies pursued in their Geological Laboratory since 1940; more particularly, the author wishes to thank Dr. H. H. Suter (Chief Geologist, Trinidad Leaseholds, Ltd.) for continued encouragement in the pursuit of these studies and Dr. Suter, Dr. F. Morton (Superintendent of Research and Development, Trinidad Leaseholds, Lt.), and Dr. G. D. Hobson, for critical reading of the manuscript.

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Accounting for Profits

■ CONTINUED FROM PAGE 81

way. Furthermore, a drilling rig operates as a unit and while transfers between rigs are made from time to time, they are not frequent enough or large enough to cause serious accounting problems. Another factor in favor of depreciating a rig as one unit is the obsolescence factor which renders many items of drilling equipment useless before they are worn out.

General Overhead:

The charge in this column is arrived at by dividing the total general overhead applicable to drilling operations by the estimated contract days for the ensuing year. Some prefer to arrive at the daily rate by using the average contract days over the previous three years or to use the days in what they consider a "normal" operating year (good and bad averaged together). The "normal" operating year will vary between contractors but some consider 250 contract days per rig as constituting a normal year. The daily charge, therefore, for general overhead by a contractor having five rigs would be the estimated total general overhead for the year divided by 1250.

Conclusion:

The use of the daily income and expense sheet herein is not burdensome. Once the operating data is assembled, use of the form is very simple and very worthwhile.

Success of any accounting function which serves management to any great extent must rely on the information furnished by personnel of the operating department, mainly tool pushers. So it is with the form of daily income and expense sheet proposed herein. Tool pushers should be prompt in forwarding drilling reports, invoices, transfers, etc., to the accounting department and cooperative in discussions dealing with cost problems involving operating performance.

One of the principal advantages of the daily operating report is that it contains all of the elements of cost affecting the net profit from operations based on actual operating data. Some contractors are prone to forget about depreciation, overhead, and other general forms of expense when they get anxious about a contract on which they have been asked to make a competitive bid. The result is a bid too low to make a reasonable profit and eventually economic strife for themselves as well as unfavorable prices for the entire drilling industry in a given area.

Shale Methods Detailed

The Department of Commerce has made available a comprehensive report on German and French methods for producing oil from shale based on 1945 investigations of the Technical Oil Mission.

The Germans were preparing to produce shale oil in large volume toward the end of the war, and actually had built plants in Estonia to produce 100,000 metric tons which were captured by the Russians only a few days before they were to be put into operation.

Copies of the 91-page report (European Shale-Treating Practices: PB-32519) may be had without charge upon application to L. L. Newman, chief of the Foreign Synthetic Liquids Division, Bureau of Mines.

FPC Threatens Gas Conservation and Supply

By HINES H. BAKER
Executive Vice President, Humble Oil & Refining Company

THROUGH the efforts of competitive private enterprise, great progress has been made in the technology of oil finding, production, and refining, resulting in oil conservation to the advantage of producer and consumer alike. Similar technological progress has been made in the direction of gas conservation; however, the industry faces today through the activities of the Federal Power Commission a threat to the private enterprise system of oil and gas production and a setback to gas conservation. Unless this encroachment of federal bureaucracy can be resisted and the activities of the Federal Power Commission be limited to the proper sphere as intended by the Congress, prospects for natural gas conservation are dim and increased waste is imminent, to the detriment of the public and the industry.

Federal Encroachment

What is this threat? Whence does it arise, and what is its nature?

In 1938 the Congress passed the Natural Gas Act. This Act, as is clearly shown by statements of its proponents before Congress, debates on the floor, committee reports, and early FPC interpretation, was intended to regulate the interstate transmission of gas and the sale thereafter in interstate commerce for resale, but not its production and gathering at one end, nor its local distribution at the other. Production at one end and retail distribution at the other are proper subjects of state regulation. The purpose of the Act was solely to close a gap in interstate commerce where the states lacked jurisdiction. The Federal Power Commission was designated as the agency to administer the Natural Gas Act.

The Federal Power Commission has been encroaching gradually in the regulation of gas prices at the well. It first decided to extend regulation to gas produced by a gas company engaged in interstate transportation and resale. Next, the Commission decided that the same regulations should apply to a gas producer affiliated with a gas company. Recently, with court approval, the Commission fixed the field price for gas of a producer and gatherer in a sale to an unaffiliated interstate gas pipe line. Regulations of the Federal Power Commission limit the return allowed to 6.5 percent on the depreciated cost of the properties from which gas is sold, taking into account all the income from such properties.

What is wrong with such regulation and wherein does it threaten gas conservation and the future supply of gas to the public?

Federal regulation of natural gas production as a public utility with a fixed rate of return on initial cost is unsound and is impractical, because:

1. The production of natural gas, like the production of coal, iron ore, wheat and cattle is not a public utility function.

2. The unrealistic allowance of 6½ percent return on original cost in fixing gas prices fails to take into account the risk involved in exploration for petroleum and natural gas and development of properties. It forces different producers of gas in the same field to sell to the same purchaser at discriminatory and widely divergent prices.

That the production of natural gas is not a public utility function is clear from the nature of the business:

1. Producers of natural gas are merely producing a commodity by private enterprise, in a competitive system.

2. Producers of natural gas do not hold out to serve the public generally; they do not dedicate their property to public use. Their business is not a public service in the utility sense like the distribution of gas or electricity, where for reasons of efficiency, competition is usually limited. Instead, they produce an abundant commodity which, like coal, is sold privately in an open and keenly competitive market. The fact that gas cannot be transported by truck or railroad like coal but must be transported by pipe lines is no reason why the production of gas should be regulated as a public utility.

Hazardous Activity

Furthermore, the discovery and production of natural gas is an extremely hazardous undertaking. Much risk is inherent in these operations. No one would risk paying bonuses and rentals on wildcat leases, hazard the costs of drilling wildcat wells, most of which are dry holes, and undergo the other hazards incident to finding, developing and producing gas properties if he is limited to a 6½ percent return on the original depreciated cost of successful ventures. It requires venture capital to discover, develop and produce oil and gas properties. Venture capital will not be invested in such properties if the heavy hand of the Commission is placed on the investors and they are forced to accept all of the risk and get none of the profits that are the legitimate reward of such ventures.

The effect of Federal Power Commission regulation of gas prices at the well under the 6½ percent return restriction is to create waste through unwarranted interference with competitive forces in private enterprise. The producer is not permitted to sell his product at its fair value or open market value as a commodity, but is restricted to an arbitrary return. Conservation of natural gas is fundamentally dependent on adequate market outlets and a price commensurate with its value.

In natural gas fields which produce no oil the effect of arbitrary pricing based on costs instead of the commodity value of gas is to create confusion, to interfere with orderly marketing, and eventually to dry up the supply of gas for fuel due to inability of producers to hazard the risks of production for an arbitrarily fixed low return.

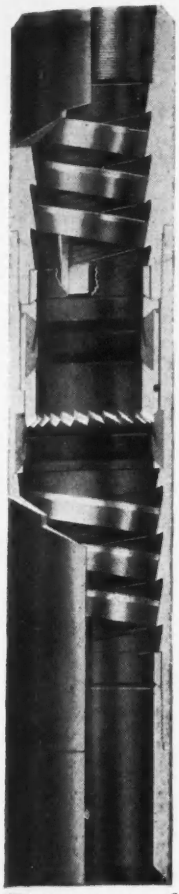
In oil fields, where natural gas is produced solely as a by-product of crude oil production, it would be uneconomic for the oil producer to market his gas under any such system of regulation. Should the oil-producing properties be operated at a profit already exceeding 6½ percent return on depreciated original cost, present FPC methods of fixing prices would require the producer to give gas away. Under such circumstances, he could not afford to make the expenditures required to conserve casinghead gas. The only alternative for the oil producer would be to flare his gas wastefully in order to escape FPC interference with his production.

The obvious and inevitable result of continuous encroachments by the Federal Power Commission is thus to enmesh gas production in the confusion of bureaucratic red tape and to cause the continued flaring of oil well or casinghead gas. Such regulation and resultant waste will ultimately deprive consumers of a commodity to which they are accustomed, will lead to the dissipation of a natural resource, to decreased revenue to producers and landowners, and will benefit no one. Even the threat of further encroachment by the Federal Power Commission is a deterrent to sale of gas by oil producers to interstate gas lines.

The Remedy

How may this situation be remedied? There is one and only one way in which the activities of the Federal Power Commission may be curbed and further gas conservation be achieved. The only solution for the problem is to amend the Natural Gas Act in such manner as not only expressly to deny to the Commission any jurisdiction over production and gathering, but also over-producing and gathering facilities and the price at which the producer or gatherer delivers or sells his gas to an interstate pipe line. The Commission's jurisdiction must be expressly limited to regulation of the trunk line interstate transportation of natural gas and the sale at wholesale of natural gas for resale after interstate transportation is completed.

This is a matter of such serious importance, of such public concern, that producers and the consuming public alike should join in securing from The Congress the necessary remedial legislation.



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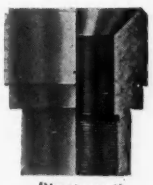

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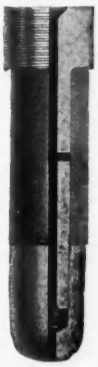

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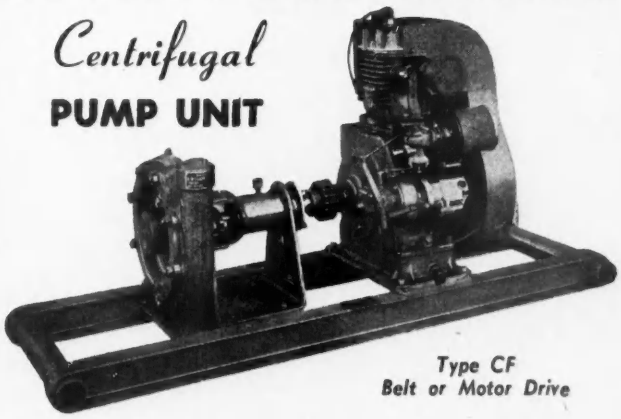

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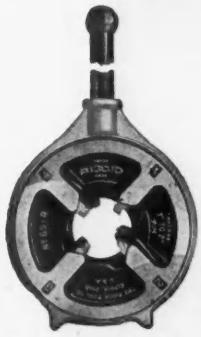

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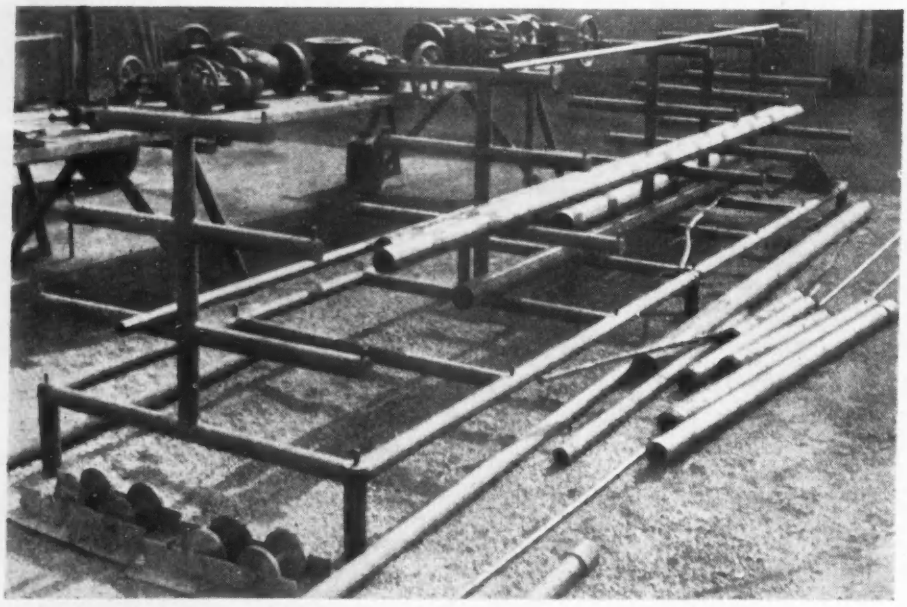

EQUIPMENT HANDLING

One of the handiest pieces of equipment around the maintenance shop of one major producing company is the multi-purpose pipe rack which was built of salvaged pipe materials. Key to the usefulness of this rack as compared with the common flat rack where classification or sorting is difficult, is the positioning of the pyramid-shaped center sections which allow rapid inspection of all materials on the multi-level, variable length arms. All welded, the two-inch material used in its construction is sufficiently strong to support the many miscellaneous types of pipe that can be stored on such a rack; materials such as pump barrels, pony rods, water pipe, conduiting and odd lengths of pipe being typical of those which may be stored for future use. The tree-like sections, of which there are five, are arranged so that material of almost any length can be racked.

At the far end, the sections are placed several feet apart, spreading to around six feet at the other end. Since all arms of any given level are placed in the same horizontal plane, it is possible to rack any length of pipe, the overhanging ends falling where they may.

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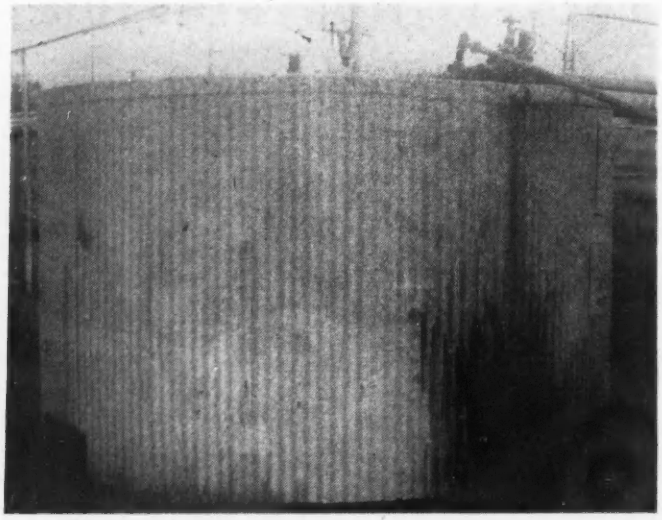

HEATING TANKS

One of the problems confronting stripper well operators is heating, conditioning and treating oil preparatory to shipping. Usually such shipments are not very large, and it would not pay to design and install an elaborate heating system. In addition, many small leases do not produce sufficient gas to fire a large setup.

One operator solves this problem by installing a very inexpensive jacket around his small all-enclosed shipping tanks. This jacket consists of vertical sections of corrugated iron tied around the tank as shown, each section extending from ground level up to the top of the tank. The tank has a heavy steel bottom, slightly convex, and supported on several short supports, raising the tank bottom eight or ten inches above the surface of the ground. A small gas burner was installed under the exact center of the tank and the heat, passing across the bottom of the tank, rises up around the side of the tank between the wall and the corrugations of the outer covering. In this manner, a very small amount of gas is consumed, and the maximum benefit is derived from the fuel due to its having to travel so far before being expelled to the atmosphere.

While ordinarily it is not practical to use a flame directly on an oil tank, it is possible here because of the very small flame that is used, and the small amount of heat generated. An advantage of this type of setup is that all materials used may be salvaged for reuse.

BETTER WAY... LOSSES!

During the past year two new Horton evaporation-saving devices have been introduced to the petroleum industry . . . The Horton Double-Deck Floating Roof and the Horton Vaporsphere. These two products, each designed for a specific service, are described briefly on these two pages.

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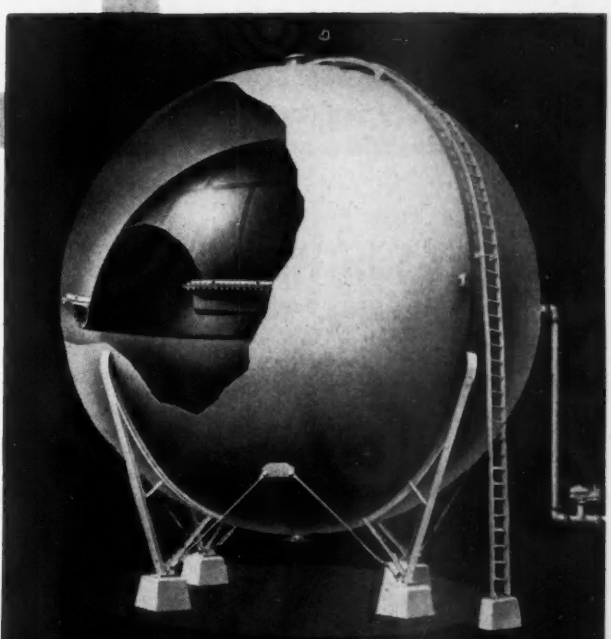

The VAPORSPHERE

The Horton Vaporsphere is used in connection with one or more fixed-roof storage tanks to prevent evaporation losses caused by *breathing*. It is connected to the tanks by vapor lines. When the contents of the air-vapor space in the tanks expands the excess vapor flows into the Vaporsphere. When the conditions which caused the vapor to flow into the Vaporsphere are reversed, the vapor returns to the tanks. Thus, since the vapors do not leave the "system", there is no evaporation loss.

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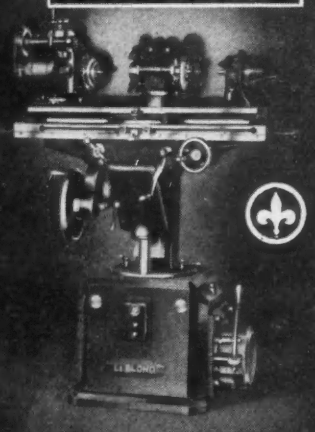

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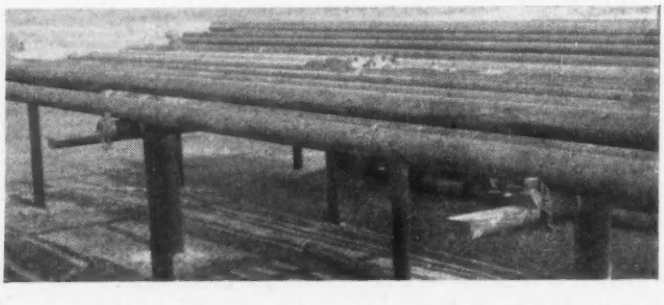
WELDING EQUIPMENT

Availability of the Army's automotive standby, the jeep, has brought about the development of a light, compact welding unit which could be towed to the job, instead of utilizing the full time of a pick-up or heavier truck.

One such welding trailer, developed to meet the hazards of rough going, utilizes two independent axles, each mounting standard 6.50 x 16 wheels. The two axles are set closely together under the reinforced frame so as to allow the storage bins at the ends to be brought down to the frame line. In the front of the trailer is mounted an engine-generator unit for normal arc-welding requirements while a special deck provides boomer-tightened chain anchorage of the cylinders of oxygen and acetylene. Horns on the forward decking provide safe coiling of the paired welding leads at the right, the twin hoses of the gas unit at the left. A manifold connects the cylinders to the hose tiein, and affords accessible control of gas flow at the free end of the supporting platform.

Into the sides are built bins for carrying equipment, the covers being hinged to swing downward to allow free access to the contents. The twin handles on each cover are provided with dogs which engage the inside of the frame, and swing down against stubs welded to the side panels. Matched holes in handle and stub accommodate a padlock so that the contents may be securely protected against loss. A second hole permits the padlock to be snapped through it, retaining the locking unit close to the door without interfering with access to the stored material.

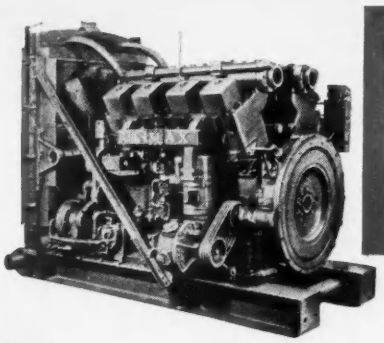
Notched Ends, Chained Pins Aid Pipe Handling



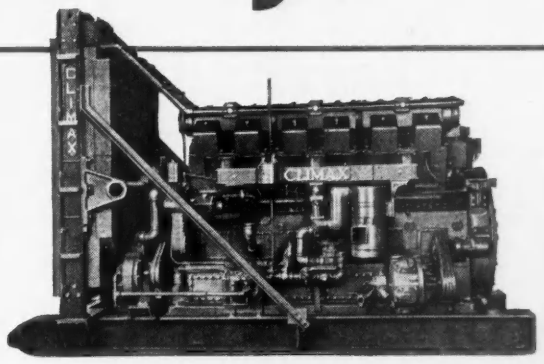
PIPE HANDLING

Loading and unloading from a pipe rack may be simplified by the use of notched rack ends similar to those illustrated. The driveway end of each of the upper horizontal members of the rack were allowed to project a foot or more farther than normally allowed. The top half of this projecting portion was cut off and a plate welded over the open cut, forming a flat surface upon which can be rested the board or timber spanning the interval between rack and truck bed. This is a distinct advantage over the usual makeshift method commonly used when skid timbers are lodged underneath the pipe or rack boards, and aside from the time saved in rigging up and the fact that the skids are nearly flush with the rack surface, the safety of unloading operations also is materially improved. Several types of skids can be used with this type rack end; inverted channel sections, boards with metal U-shaped retainer ears fastened across the ends, etc., being some of the possibilities.

Elimination of makeshift wedges and blocks for holding racked pipe in position also is accomplished in the use of small steel wedge-shaped positively locking retainer pins. The pins are chained to the rack to prevent their being lost or mislaid.



Engines that make Footage Contracts PAY!



AT TOP: Heavy duty, compact Climax VU-280 rated 280 h.p. at 1100 r.p.m. with radiator, fan and other accessories. 8 cylinder, 4 cycle, "V" type.

ABOVE: Heavy duty, compact Climax VU-420 rated 420 h.p. at 1100 r.p.m. with radiator, fan and other accessories. 12 cylinder, 4 cycle, "V" type.

AT RIGHT: 3 Husky Climax VU-420's (compounded to produce 1250 h.p.) speed-up drilling—hoist heavy loads of drill pipe fast—on this deep East Texas wildcat.

DRILLING CREWS KNOW the power and snap of Climax "V" Type engines. Know how quickly and easily they hoist heavy loads of drill pipe—how they lug through overloads—and *keep on doing a job* under toughest field conditions.

• For bulletins giving detailed specifications and performance data on these heavy duty power plants, write Climax Industries, Inc., Climax Engineering Division, or nearest distributor. General Offices: Clinton, Iowa *Regional Offices: Chicago, Tulsa, New York.*

CLIMAX OPERATING ADVANTAGES

- **Fast, smooth acceleration.**
- **Rugged construction.**
- **Medium speed.**
- **Easily accessible for maintenance.**
- **Parts stocked at all active field points.**
- **Expert field servicing.**

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Builder of Climax DIESELS and GENERATING SETS

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Storage Problem Eases but No Price Hikes Reported

Few price changes are occurring in the industry's markets as colder weather's advent begins to reverse demand trends of gasoline and heating oils. Some areas are experiencing lowered calls for gasoline and others report steady markets, while increased demand for burning oils becomes widespread. Crude supply remains tight in some areas, with reports of premium payments being offered.

Colder weather in parts of the nation is easing difficulties that were being experienced in storing stocks of heating oils, but as yet the relief has not been reflected in price raises. Excessive inventories resulted earlier in price reductions on home heating fuels on the Atlantic seaboard, but if cool weather continues in this area the situation will be cleared much sooner than anticipated, and the price drop will be wiped out. Tentative inquiry was being made as to possibility of using Maritime Commission's excess tankers for storing the Eastern seaboard's fuel oil, but regulations, costs, and the turn in the weather seem to have stopped these speculations. No recent price changes on fuel oils have been reported for the rest of the U. S. but demand has been steadily increasing.

Rumors of premium payments for crude continue and seem to substantiate predictions that increased price postings will be made before the end of the year, which many producers claim is necessary to offset increased operating expenses. Independent operators in the East Texas field are being offered premiums of 15 cents per barrel, if the purchaser is given rights to total production. Producers in this field are now being allowed an additional 5 cents per barrel bonus if they install their own gathering lines in the field.

Lubricating oils continue heavy in demand and short in supply throughout most of the country, as the supply of packaging tins shows no great improvement. Prices on lube oil remain generally unchanged, but Western Pennsylvania refiners report advances for February materials. A South Texas refiner reported increases of ¼ to 1 cent in his prices on several grades of pale and red oils.

Demand for gasoline is holding up well in Pennsylvania, Michigan, and the Gulf Coast, while sales in the Midwest and Mid-Continent are being slowed considerably by snow and heavy rains. One Western Pennsylvania supplier reported that his price on regular-grade, which dropped to 7¼ cents last week, was being raised to his former posting of 7½ cents as demand had picked up. There were no other reports of changes in gasoline market prices.

Petroleum Products Among U. S. Surplus Items Abroad

Petroleum products and coal originally costing the government $39,814,000 and rubber products costing $40,460,000 are included in the $5,806,032,000 worth of property declared surplus to the Foreign Liquidiation Commissioner up to August 1, last, it was reported to Congress last week.

These figures, covering military stores abroad at the close of the war, do not include many items in bulk sales made to foreign governments.

Sixty-eight tankers were among the 5721 vessels declared surplus up to last September 30. Forty-nine of the tankers have been disposed of.

Standard Oil of California Forms Exploration Department

O. J. Haynes

Geo. M. Cunningham

Standard Oil Company of California has formed an exploration department to handle land and lease, geological and exploration activities, with the exception of exploratory drilling. George M. Cunningham will be general manager and O. J. Haynes assistant general manager of the department.

Cunningham has been with Standard since 1921. He was made assistant chief geologist in 1937, chief geologist in 1943, and became general manager of exploration for the producing department in 1944. Haynes joined Standard in 1923 and worked with the land and lease division of the producing department until 1937, when he went to the foreign division. He returned to the U. S. in 1941 as a land and lease representative. In 1943 he was transferred to Los Angeles as superintendent of exploration, southern division of the producing department.

Three superintendents of exploration also have been appointed: W. P. Winham, southern district; G. L. Knox, northern district; and A. J. Solari, Bay district. W. F. Barbat was named assistant chief geologist. Staff members continuing with their former titles are W. S. W. Kew, chief geologist; S. H. Gester, assistant chief geologist; G. C. Gester, consulting geologist; Phil Gaby, consulting geophysicist; G. F. Schroeder, manager of the land and lease division; and L. H. Hines, assistant manager of the division.

New Leasing Regulations Disappoint Industry Group

Oil men in public land stands are much disappointed at the recently announced oil and gas leasing regulations, according to Warwick M. Downing, of Denver, who headed the industry coordinating committee which made recommendations at Denver September 30. Of the 14 such recommendations, two were adopted, two more adopted in part, and ten ignored, Downing said.

"Of the two adopted, one was a recommendation concerning acreage limitations and the other was unimportant," Downing recited. "A third recommendation concerning options was granted in part, but the principal part thereof was ignored. A fourth recommendation, which was granted in part, restored to 25 cents per acre the rental for the fourth and fifth years, which the tentative regulations had increased to 50 cents per acre, but on the other hand, the regulations added a new provision for a 50-cent rental for every year after the five-year extension term granted by the act, a total of $2.50 per acre for the five-year extension term instead of one dollar for the original term.

"Among the recommendations ignored were the following: That the government adopt a formula for determining the productive boundaries of deposits upon which the right to ⅛ royalty on existing leases depends and adopt the same formula as applicable for determining the boundaries of participating areas in unit agreements; that the department make determinations of such boundaries in advance and also make determinations in advance as to whether wells drilled or to be drilled will be considered as new discoveries, the intent being that any operator shall be entitled to know in advance what his royalty will be; that the government declare that its determination of boundaries as published and posted in the land offices may be accepted and acted upon by persons dealing with the public domain; that the arbitrary powers of the secretary to determine the price of royalty oil be modified; that the departmental provision that no government lessee may create an overriding royalty in excess of 5 percent be revoked; that the showing of citizenship as to stockholders in corporations be simplified and made possible of performance; and likewise other provisions which were considered by operators to be important to facilitate the administration of the law."

However, Downing declared, it is generally felt that the results from the Denver conference will not be altogether lost, but that further cooperation will result in bringing about the changes the operators principally desire.

McMillan Heads Chapter

John R. McMillan, manager of field operations for Fullerton Oil Company, was elected 1947 chairman of the Pacific Petroleum Chapter of the Petroleum Division of AIME following conclusion of the two-day technical session held at Los Angeles. Three new members of the Petroleum Chapter council were elected: A. W. Gentry, superintendent of operations, Long Beach Oil Development Company; R. L. Parsons, petroleum engineer, Standard Oil Company of California; and Frank S. Parker, geologist, Signal Oil and Gas Company.

Other officers held over from last year, members of the Petroleum Chapter Council are N. Van Wingan, senior production engineer, Richfield Oil Corporation, who will also serve as secretary-treasurer; T. H. Acres, assistant chief engineer, Richfield Oil Corporation; Carlton Beal, petroleum consultant; John DeHetre, chairman of the Junior Division; and W. W. Porter II, consulting geologist, retiring 1946 chairman.

Humble Shuts in Florida Wells

Humble Oil & Refining Company's four producing wells in the Sunniland field, Collier County, Florida, have been shut in until a plan for transporting oil is devised. The wells make between 500 and 1000 barrels daily, and all available storage is filled. A railroad may be asked to go in and get the oil, or a pipe line will be built. Sunniland field is the only oil producer in Florida.

☆ California

Costly Kern County Test Due For Abandonment at 12,553

Costly Kern County deep test scheduled for abandonment after drilling for year to 12,553 feet; Pacific Western is near California depth record; Lawndale scheduled for drilling revival; Castaic area, unnoticed for years, has 3 new wildcats; location staked for another Gardena test well; Half Moon Bay area coming to life.

Kern County: One of the most expensive prospect holes in recent California drilling appeared to have ended in failure when Seaboard Oil Company, operator, started out of the hole for the last time in BVA 73-14 in 14-32s-25e, Buena Vista Lake area. Total depth is 12,553 feet. Partners with Seaboard in the project, which was spudded a year ago, are Wilshire Oil Company, Universal Consolidated Oil Company, and Mohawk Oil Company. Operator ran into a fishing job in March at 11,495 feet, which eventually required redrilling from 3850 feet. Attempts to get back in the old hole failed and a new hole was drilled all the way to present bottom. Drilling in recent weeks has been in very hard shale. Before abandoning, operator will gun perforate and test a Pliocene gas sand indicated on the electric log at about 7000 feet.

Pacific Western Oil Corporation is drilling below 16,150 feet in its deep Vedder test, National Royalties 1 in 5-26s-22e. At that depth the well is 96 feet from the California depth record and 505 feet from the world's record (held by Phillips Petroleum Company's Schoepps 3, Brazos County, Texas, which went to 16,655 feet). It is believed to be the deepest hole ever drilled by a contractor (Loffland Bros.).

Tide Water Associated Oil Company has reached 3250 feet in its Kettleman Hills South Dome test, Fee 65-18 in 18-25s-20e. Formation is hard shale.

Los Angeles County: Petrol Corporation has acquired the Smith Development Company's property in the Lawndale field and plans to deepen several wells. Objective is believed to be fractured basement, now productive in the El Segundo and North El Segundo fields to the northwest. The Lawndale field, discovered in 1928, was a notable town-lot flop. Only 7 wells ever produced oil. Over 60 dry holes were drilled in a matter of weeks.

Two miles north of Castaic in 13-5n-17w, Republic Operators, Inc., wholly-owned subsidiary of Republic Petroleum Corporation, is rigging up to drill Republic Fee 1. About 3000 acres are under lease. This is the third wildcat to be announced in 10 days for an area that has not been prospected for many years. Nearest production is in the Oak Canyon field, about 6 miles to the southwest.

In the Alondra area (Gardena) H. C. Christi has staked Johnson 1, test well in 22-3s-14w about 1700 feet northeast of the discovery well of the Alondra field. This is the third extension test for this area since the discovery last July.

San Mateo County: The Half Moon Bay area, scene of shallow prospecting at intervals for many years, is getting a new play. E. T. Willard has located 2 prospect holes in 15-6s-5w and has drilled a third project to 2100 feet where he is rigging heavier equipment to drill deeper. In 14-6s-5w, a group called the Elk Hills Oil Pool attempted to go back in an old shallow hole drilled years ago, found it impossible, and is now drilling a new hole at approximately 1080 feet alongside the old well.

Kings County: Kings County Oil Company is preparing to test for production in von Glahn 1 in 4-23s-22e. About 40 ½-inch holes were shot around 12,700 feet.

Standard Oil Company of California's 73-30V in 30-23s-19e, a deep test on the Middle Dome of Kettleman Hills is making slow progress below 11,890 feet in very hard shale.

Oregon

The Texas Company has announced plans to drill again for oil in Columbia County at a site approximately 12 miles south of Clatskanie. The new test will be about 8 miles southwest of the hole drilled by the company and abandoned in September, 1945, after reaching 5650 feet.

The firm also abandoned Cooper Mt. No. 1 test in Washington County last May at 9263 feet after no trace of gas or oil was found.

☆ Oklahoma

Dewey County Deep Oakwood Test Shows for Producer

Deep Oakwood test shows for small producer; state's deepest test is drilling ahead; 10,000-foot wildcat to be drilled on Stephens County block; new zone proved in Wayne sector; dry holes gain in Cotton County; Gulf gets 1700-barrel well in Seminole County; wildcat on Middleburg high being plugged.

Dewey County: Oklahoma Natural Gas Company's deep Oakwood Unit 1, NW NW NW 6-17n-14w, near Oakwood Townsite—a wildcat that has been in the process of drilling and testing for nearly a year—appears to be showing for a small oil producer in the Layton sand zone, from 7910-8010 feet. With a total depth of 12,610 feet in the Wilcox sand, the wildcat made 78 barrels of 39-gravity oil on 19-hour test. The well continues to swab, and is reported making a fairly good recovery. Seven-inch casing was cut and pulled, and the present perforations made in the zone which was tested on the way down.

Caddo County: The Superior Oil Company of California has broken all depth records for drilling in Oklahoma, with its Weller 51-11, NW NW NE 11-8n-12w, near Fort Cobb. The test passed the 14,582-foot mark set in 1939 by Continental Oil Company, and is drilling on, seeking a new depth mark for all other

Wells Completed in United States in Week Ended November 2, 1946

State or District	FIELD COMPLETIONS: New Wells: Oil	Dist.	Gas	*Input	Dry	Total	Old Wells Deepened	EXPLORATORY COMPLETIONS: Oil	Dist.	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	This Week 1945
Alabama	....	....	....	....	....	....	....	....	....	....	1	1	1	....	....
Arkansas	1	....	....	....	1	2	....	....	....	....	....	....	2	2	4
California	25	....	....	....	....	25	1	....	....	....	8	8	34	34	31
Colorado	3	....	....	....	....	3	....	....	....	....	....	....	3	6	1
Illinois	20	....	....	....	11	31	1	1	....	....	6	7	39	72	35
Indiana	5	....	2	....	3	10	1	....	....	....	2	2	13	11	1
Kansas	10	....	6	1	10	27	3	....	....	....	5	5	35	45	45
Kentucky	6	....	1	....	3	10	....	1	....	....	1	2	12	5	....
Louisiana	14	....	....	1	7	22	....	4	1	....	6	11	33	32	29
North Louisiana	9	....	....	....	3	12	....	....	....	....	4	4	16	20	13
South Louisiana	5	....	....	1	4	10	....	4	1	....	2	7	17	12	16
Michigan	4	....	1	1	3	9	....	....	....	....	9	9	18	17	18
Mississippi	5	....	....	....	1	6	....	....	....	....	4	4	10	1	7
Missouri	....	....	....	....	....	....	....	....	....	....	2	2	2	....	....
Montana	3	....	1	....	2	6	....	....	....	....	....	....	6	7	10
New Mexico	5	....	....	....	....	5	2	....	....	....	....	....	7	10	10
New York	15	....	....	11	....	26	....	....	....	....	....	....	26	26	25
Ohio	8	....	8	....	11	27	2	....	....	....	2	2	31	29	14
Oklahoma	56	....	4	3	18	81	1	2	....	....	15	17	99	82	47
Pennsylvania	27	....	8	15	1	51	....	....	....	....	....	....	51	49	46
Texas	94	2	7	3	26	132	4	5	....	1	28	34	170	148	160
E. Tex. Bor. Co.'s	2	....	3	....	1	6	....	....	....	....	....	....	6	8	9
Rest of E. Texas	8	....	1	2	....	11	....	....	....	....	1	1	12	7	7
North Texas	29	....	....	....	11	40	....	3	....	....	8	11	51	37	34
W. Central Texas	8	....	....	....	6	14	....	....	....	....	4	4	18	12	11
West Texas	28	....	....	....	2	30	3	1	....	....	2	3	36	36	31
Texas Panhandle	2	....	1	1	....	4	....	....	....	....	....	....	4	....	8
G. Coast, Upper	5	....	....	....	2	7	....	1	....	....	2	3	10	17	14
G. Coast, Lower	9	2	2	....	1	14	1	....	....	1	3	4	19	21	31
Southwest Texas	2	....	....	....	3	5	....	....	....	....	4	4	9	7	13
S. Central Texas	1	....	....	....	....	1	....	....	....	....	4	4	5	3	2
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
West Virginia	5	....	11	....	3	19	....	....	....	....	....	....	19	7	19
Wyoming	1	....	....	....	....	1	....	....	....	1	....	1	2	4	8
Total U.S.	307	2	49	35	100	493	15	13	1	2	89	105	613	588	510

* Includes salt water disposal wells.

24,000 GMV HORSEPOWER at Lion Oil

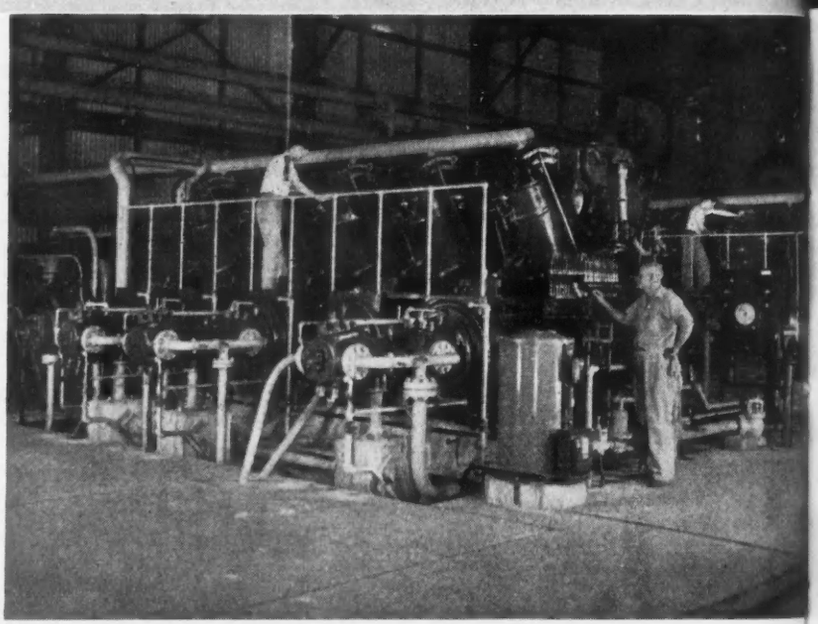
From Blockbusters to Famine-busters!

HERE is an example of how America's engineering and production ingenuity can often convert machinery of war into peacetime instruments for nation-wide, even world-wide betterment.

In this vast ordnance plant, originally dedicated to wartime destruction, big Cooper-Bessemer engine-driven compressors are still helping to produce synthetic ammonia from natural gas. Up to 500 tons are produced here daily . . . but no longer for the making of high explosives. It is now converted into ammonium nitrate fertilizer.

There are of course hundreds of important uses for ammonia. Used for conversion to critically needed fertilizer, it will go far as a "famine-buster" to help grow crops to feed a hungry world.

This is one of the largest compressor installations ever made — 24 Cooper-Bessemer 10-cylinder gas engines, delivering 24,000 compressor horsepower. During the war years and on into peace these units have been demonstrating the long-range dependability and efficiency that GMV users in *all* fields have learned to expect from these modern Cooper-Bessemers.

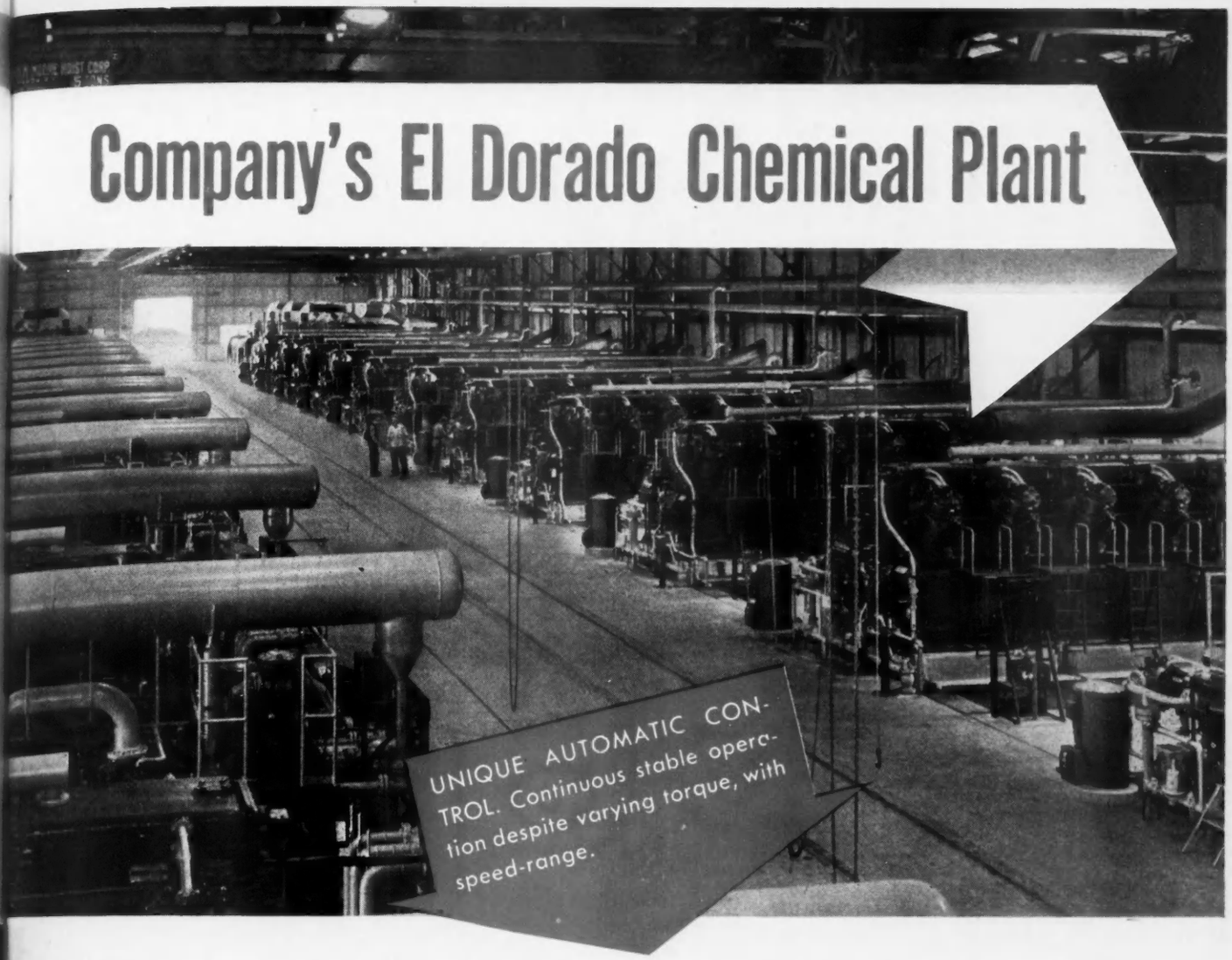


Close-up of one of the 24 GMV's installed at Lion Oil Company's El Dorado Chemical Plant. Twelve, of which this is one, are high-stage units automatically controlled to match exactly the process demand at all times.

TYPE GMV ANGLE Compressors

New York · Washington · Bradford, Pa. · Houston, Dallas, Greggton, Pampa and Odessa, Texas · Los Angeles

Company's El Dorado Chemical Plant



One feature of this big, 24-unit compressor installation is the system of automatic control. Two pneumatic pressure controllers regulate the speed of 12 of the compressor engines from 150 to 300 rpm to maintain a constant suction pressure to the 12 high stage compressors.

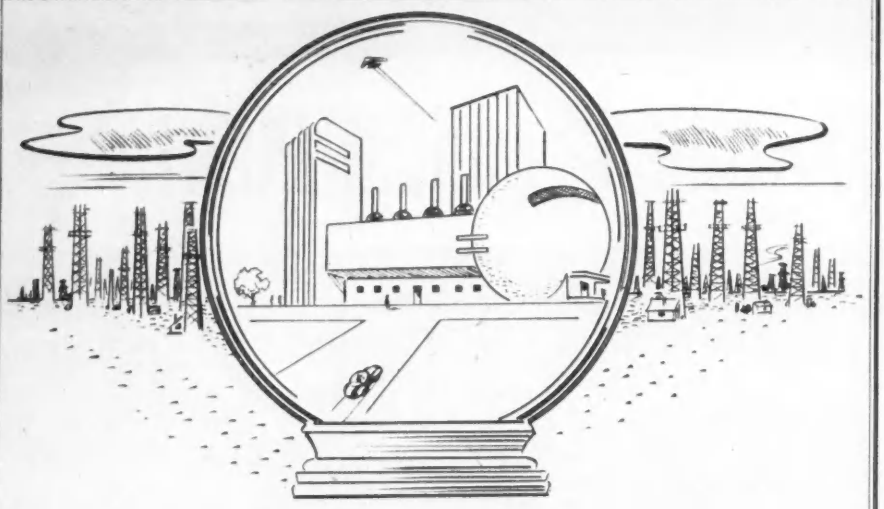
This type of automatic control successfully holds pressure or flow rate within an accuracy of 1%, with the least possible disturbance to the balance of the process. Due to low engine speeds, fuel and maintenance costs are exceptionally low. Instead of the conventional hydraulic or mechanical governor, Cooper-Bessemer's patented Exact Rate Governor speed control is used. It is ideal in this kind of installation, offering many advantages where continuous stable operation is necessary under varying torque and over a wide speed range. There is no appreciable "dead" zone of control correction. The rate of fuel correction, after a speed deviation, is not fixed, but is proportional to the rate of deviation. The instrument adjustments permit the rate of correction to be better regulated for the individual engine. Also, the Exact Rate Governor control permits direct, manual regulation of the amount of fuel for starting, resulting in easier, quieter, and *better* starting.

These are only a few of the advantages this one Cooper-Bessemer feature is bringing to various users in the chemical and petroleum industries. And it is only one of many outstanding GMV features.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Parkersburg, W. Va. San Francisco, Calif. Seattle, Wash. Tulsa Shreveport St. Louis Caracas, Venezuela



THE PAST FORETELLS THE FUTURE

The accomplishments . . . both wartime and peacetime . . . which comprise the colorful past of the petroleum industry, today inspire forward-looking leaders to even greater achievements in the new world that lies ahead.

The oil and gas industry can and will meet the challenge of tomorrow's new markets and new ideas with specialized, time-proved ability, resourcefulness and determination.

The Banks of Fort Worth, through long and close association with every phase of this vital industry, offer experienced and understanding service in oil financing.

The First National Bank
The Fort Worth National Bank
Continental National Bank

FORT WORTH, TEXAS

states. At latest reports the well was drilling below 14,864 feet, having cut 282 feet of hole in 4 days. Continental's deep test, Proctor 1, CNW 28-10n-20w, in Washita County, was abandoned in December, 1939.

Stephens County: Vickers Petroleum Company has staked Walker-Voorhees 1, NE NE NE 2-2n-4w, in the extreme northeast corner of the county, for a 10,000-foot or Bromide zone wildcat. The test had been planned for several months, and is on a 5000-acre block situated over an old structure. The block is in Secs. 1, 2, 11 and 12-2n-4w, Stephens County, and 31-3n-3w, and 35 and 36-3n-4w, Garvin County. Payne Oil Company has contract and will move in rig as soon as possible. This is one of the oldest mapped structures in Southern Oklahoma. In 1920, Humble Oil & Refining Company drilled a 2880-foot test with cable tools in SE NE NW of 1-2n-4w, and in later years several shallow tests were drilled in the area. Surface geology was worked by Humble Oil & Refining Company, the late Clyde Becker, C. D. McGaha and H. B. Fuqua. In recent years the area has been seismographed a number of times.

McClain County: A new zone has been opened in the Southwest Wayne pool by J. R. Porter's White 1, NW SW SE 24-5n-2w. The well was flowing to tanks through ½-inch choke from the Bois d'Arc section of the Hunton lime, through perforations at 6606-30 feet. The discovery well of the pool is producing from the Pennsylvanian. Geologists say pay seems to be pinched out to the south, by an east-west fault, while to the east there is a regional dip.

Cotton County: Although drilling activity and lease buying is at an all-time high in the county, dry holes continue to gain in the area. Despite a few good pool-openers and extensioners, these dry holes are continually showing up, with nearly a dozen in a week's time. Latest dusters include W. A. Delaney Jr.'s Hooper 1, NE NE NE 5-2s-11w, south of Junction City and northwest of Walters; Barbre & Griffin's Schaelzel 1, NW SW NW 19-2s-11w, 2 miles east of Emerson; Roy Fisher et al's Wallace 1, SW SW SW 3-2s-12w, 3 miles north of Emerson; C. H. Featherston's Waller 1, SE SE NE 23-4s-10w, 4 miles south of Temple.

Seminole County: Gulf Oil Corporation brought in a good producer in its new Garcreek pool, when Patterson 1, SW NE NW 17-10n-7e, flowed 1716 barrels of oil, with 1½ million cubic feet of gas in 24 hours. Pay came from the Gilcrease sand at 3716-32 feet, total depth.

Grady County: One of Oklahoma's most closely-watched wildcats, George P. Livermore, Inc.'s Giles Ranch 1, CNW NW 35-8n-5w, on the Middleberg high southwest of Blanchard, is being plugged at 12,253. Although several good shows were encountered up the hole, operators are preparing to abandon the test, which has been active since last Christmas. Contract was to test the Wilcox sand on a 3500-acre lease block. Total depth was reached July 27, after which crews started plugging back, acidizing and testing. One test in the Viola lime blew gas and mud over the derrick, but the flow was soon exhausted. Last tests were in the upper Hunton lime zones and basal Pennsylvanian sands, where as much as 40 barrels of oil was swabbed a day. The amount of oil decreased, however.

☆ Kansas

Ellis County Pool Opened; Mitchell County Test Watched

Texaco wildcat opens oil pool in Ellis County; Salina Basin area test may prove production in Mitchell County; attempt to extend Hiss pool north is failure; Marion County wildcat logs shows of free oil on test.

Ellis County: The Texas Company apparently has opened another oil pool with Dreiling 1, SW SW SW 15-13s-17w. The wildcat recovered 1000 feet of oil on a 15-minute drill-stem test in the Arbuckle lime from 3560-83 feet. Testing continues. The well is 2 miles south of the Catherine pool, and is on a 1600-acre lease block owned by the company.

Mitchell County: A wildcat attracting much interest is Olson Drilling Company's Polen 1, NW SW SE 26-8s-10w, drilling below 1500 feet, and headed for about 4000 feet. Fort Riley sand is due at approximately 2800 feet. At present there is no oil production in the county, and nearest oil production is in the Russell pool, Russell County, 28 miles southeast of the Olson test. The Laton pool of Rooks County is approximately 30 miles west of Polen 1. Geologists believe the area around the test is favorable for oil production.

Barton County: The Bridgeport Oil Company's attempt to extend the Hiss pool ½-mile north has ended in failure. Davis 1 "C", SE SE SW 25-20s-14w, has been abandoned in the Arbuckle lime at 3530 feet. Lansing was topped at 3202 feet with a show of oil at 3277-82 feet. Conglomerate was found at 3506 feet, and Simpson sand at 3518 feet.

Marion County: Looming as a possible oil pool opener is Hutchinson Oil Company's Ptacek 1, SW SW SW 20-19s-4e, 3 miles southeast of the Propp pool. Good shows of free oil were logged at 2596-600 feet and at 2608-10 feet. Operators are testing. Viola lime was topped at 2594 feet.

☆ New Mexico

Chaves Test Has Pre-Permian Beds at Shallow Depths

Chaves County has significant wildcat due to fully developed pre-Permian beds being present at comparatively shallow depths; deep test in Hobbs field logs additional middle Permian shows; Brunson field extension completes from Basal Ellenburger sand.

Chaves County: Magnolia Petroleum Company's Black Hills Unit 1, C NW NE 31-17s-20e, and supported by a 17,627-acre unitized block, developed geological information that will accelerate prospecting for Ordovician production outside of Lea County, which accounts for the state's 3 Ellenburger producing areas. Previous Ordovician prospects in the general area failed to reach their objective due to encountering igneous rock. Black Hills Unit 1 entered the Pennsylvanian at 4380 feet; Mississippian at 4895 feet; Devonian at 5145 feet, Fusselman at 5170 feet; and Simpson at 5830 feet, with elevation of 4902 feet. These 5 zones have accounted for production in the West Texas portion of the Permian Basin. A nominal show of gas with water was encountered at 5110-68 feet, and water was encountered at 5264-

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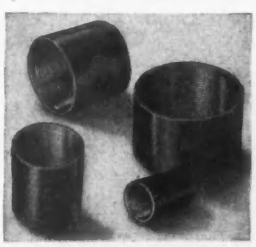

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logged in the top of the Simpson followed by dolomite, and the test was drilling chert and dolomite at 6080 feet. Additional explorations will be given the area regardless of the outcome of this prospect.

Lea County: Sun Oil Company's McKinley 1-B, northeast edge of the Hobbs field, recovered 100 feet of gas-cut mud when tester was used at 7212-81 feet in Basal Clear Fork, and was drilling lime at 7562 feet. A nominal show of gas was passed up at 6789-6938 feet in the Tubb, topped at 6590 feet. Standard Oil Company of Texas' 1-29, NW SE SE 29-18s-38e, the forerunner of a large-scale program of plugging back marginal wells to the more prolific Bowers sand passed up, flowed 528 barrels of 41.6-gravity oil natural through 1-inch choke from perforations at 3148-3241 feet. The company is plugging back State 2-29. Both were completed in 1930. The 4 wells on the 80-acre lease have produced in excess of 1 million barrels of oil from the regular pay.

Amerada Petroleum Corporation's Corrigan 5, ½ mile north extension for the Brunson field, flowed 818 barrels of oil, with gas-oil ratio of 1060/1, initial through ½-inch choke from perforations at 7771-7803 feet in Basal Ellenburger sand, or detrital.

Bradford Celebration

Bradford, Pa., center of Pennsylvania's crude oil production industry, will commemorate the 75th Anniversary of the opening of the Bradford oil field with a three-day community celebration, November 18-20.

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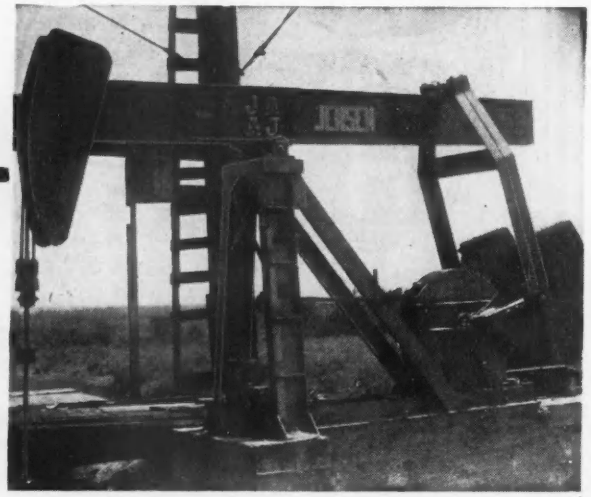

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☆ West Texas

Devonian, Shallow Gas Strikes Give Block 12 Two New Pays

Devonian oil discovery and shallow gas strike gives Block 12 field 2 new pays; Ellenburger production eliminated in Union field; big Ellenburger well on northwest edge of TXL field; Ward County prospect reaches water in Glorietta.

Andrews County: The Atlantic Refining Company's University-Texu 1-E, C NE NE Sect. 18, Block 12, 2 miles west of Clear Fork production in the Block 12 field and a failure in this zone, was swabbing and flowing 7 barrels of oil hourly, with wash water and possibly formation water, after acidizing 3 zones of perforations between 8454-8570 feet. Production is from Devonian, topped at 8450 feet, with elevation of 3296 feet, and drilled to 8817 feet.

Phillips Petroleum Company's University 1-O, 1 mile southeast of the above discovery and also a failure in the Clear Fork, was preparing to make production test of open hole at 8258-8600 feet in Devonian broken pay, topped at 8253 feet with elevation of 3307 feet. This confirmation well correlates 208 feet high on the top of the Devonian, and is expected to make a more productive well, although drill-stem tests were not as productive.

The Texas Company's University 2-T, C NE SE Sect. 22 and on the southeast edge of the field, was completed as a gas discovery in the Yates, having gauged 2,676,000 feet of dry gas daily on open-flow test of broken sand at 2799-2950 feet. This production perpetuates the 160-acre lease, which along with many others in the area requires production by November 14. The majority of the 30-well drilling program launched after the completion of the Clear Fork discovery by The Texas Company in August will be abandoned as failures else leases forfeited by expirations. Three were abandoned due to low structural position, while 2 were junked; and only 4 have been completed in the Clear Fork.

Union Deep: Shell Oil Company's Scarborough 1-E, offsetting Clear Fork production, was eliminated as a pre-Permian prospect in developing 7500 feet of sulphur water without shows when tester was used at 9425-9528 feet in Ellenburger, topped at 9380 feet with elevation of 3385 feet. The structural position of this test was made to order for an Ellenburger discovery as the pre-Permian beds thinned due to the absence of the Mississippian, Devonian and Silurian.

Stanolind Oil & Gas Company's Lotus 1-D, southwest edge of the South Fullerton-Devonian field, was running pipe to complete at 7333 feet in the Clear Fork, which indicated commercial production on drill-stem tests. It is outside the productive limits of the Devonian area.

Humble Oil & Refining Company's Sims 2, 3⅛ miles northwest of the Nelson 10,400-foot Ellenburger pool, was drilling Basal Simpson at 9895 feet. Top of the Devonian was called at 7890 feet, correlating 524 feet high to a 8555-foot failure 2¼ miles northeast.

Ector County: The Texas Company's Thomas 6, northwest edge of the main feet, having plugged back from 4191

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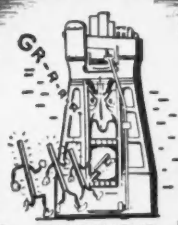
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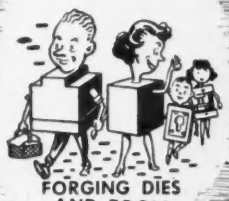
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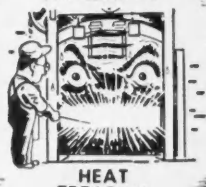
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Tracts located in Andrews, Hudspeth, Crockett, Irion, and Pecos counties; date of sale, December 14, 1946; to be held at the Stephen F. Austin Hotel, Austin, Texas, to begin at ten o'clock A.M.

For additional information write to the Secretary, Board for Lease of University Lands, University Station Box 2125, Austin 12, Texas.

sector of the TXL field and about 150 feet low to the east offset, was not handicapped by its low structural position as the well flowed 264 barrels of oil and wash-water natural on 2-hour preliminary test of Ellenburger open-hole at 9753-9840 feet. Texas' Parker 2-C, southeast edge of the field, swabbed 50 barrels of oil daily after using 9000 gallons of acid through Devonian perforations at 7698-7875 feet.

Allowable production for the Devonian wells in the TXL field has been boosted from 138 to 236 barrels daily, while the more durable Ellenburger was raised from 200 to 403 barrels daily. Both zones are subjected to production holidays ordered by the Commission, but owners of Devonian wells are expected to protest in view of the decline in reservoir pressure and threat of excessive gas-oil ratios.

Prospects: Argo Oil Corporation's Roberts 1, Reeves County, was attempting to drill out bridge formed while swabbing and heading oil from open hole at 9895-11,900 feet, having plugged back from 14,076 feet. This wildcat entered the Wolfcamp at 10,120 feet. In Crockett County, Stanolind's University 1-GG, indicated Ellenburger discovery, swabbed 11 barrels of oil and 121 barrels of water on 12-hour test after nitro shot and acid treatment of open hole at 8298-8377 feet, having plugged back from 8384 feet. A commercial gas-distillate producer was indicated in the top of the Ellenburger, entered at 7975 feet.

Ward County: Stanolind's Sealy-Smith 1-B, 2½ miles east by south of production, resumed coring at 4940 feet after recovering 150 feet of gas-cut mud with trace of salt water when tester was used at this level in the Glorietta, topped at 4820 feet. Previous tests at 4880 feet and 4910 feet also yielded gas-cut mud, possibly warranting the landing of pipe for completion try.

Compact to Hear Knowlton And Baumel at Dallas Meet

Two technical speakers for the Interstate Oil Compact Commission's meeting in Dallas, December 9-11, are as follows:

Don R. Knowlton, Oklahoma City, will speak on "Proper Reservoir Control." He was wartime Director of Production for PAW, resigning to head Phillips Petroleum Company's foreign department, but more recently engaging in consulting engineering.

Jack K. Baumel, chief engineer of the Texas Railroad Commission, will speak on "Effective System of Statewide Gas Proration and Ratable Taking."

Earl Foster, executive secretary, reported that all compacting and four non-compacting states have made reservations.

Appointment of three Illinois men to Compact committees and reappointment of a fourth was approved by the Commission's executive committee at its October meeting. Recommended by Clarence T. Smith, Illinois representative, appointments were as follows: Samuel F. Peterson, Springfield, reappointed to the regulatory practices committee; Dr. A. H. Bell, Urbana, research and coordinating committee; Ivan G. Burrell, Bridgeport, engineering committee, and E. J. Coyle, Springfield, legal committee.

☆ North Texas

Haskell County Has Flowing Discovery from Strawn Sand

Haskell County has flowing discovery from Strawn; production test pending by probable oil discovery in Montague County; Throckmorton County's McKnight field given major extension.

Haskell County: Thos. D. Humphrey's Chapman 1, Block 60, H. Tidwell Survey and 3 miles northeast of the Lawson field, was flowing 10 to 20 barrels of oil hourly through open tubing into pits after using 2000 gallons of acid through Strawn perforations at 4070-82 feet. This discovery was drilled to barren Mississippian at 5347-5470 feet, and also indicated production in Strawn sands at 4240-4315 feet, and Canyon at 2550-70 feet. A twin test is preparing to complete in the latter. Owner controls the area with a supporting block of 13,500 acres. This strike will result in a trunk line being extended to the area and also the Lawson field.

W. C. Estes and Wagoner's Brunstedt 1, Block 25, J. Scott Survey and 4⅛ miles northwest of the Lawson field, tested oil and water from Upper Strawn perforations at 4060-68 feet, having plugged back from 4702 feet.

Montague County: Eason Oil Company's Yarbrough 1, F. J. Bellows Survey A-33 and ¾ mile south of the Bowers field, was drilling plugs from 7-inch casing at 4046 feet to try for completion in oil sands at 4054-68 feet and 4084-4101 feet. Both zones yielded oil and gas through tester, with the latter also showing some water. This outpost is slightly higher than the nearest field completion, which was depleted and abandoned at 4048 feet.

Throckmorton County: Fred M. Manning, Inc.'s McKnight 3, Sect. 2, Day Land & Cattle Company Survey, extended the McKnight field 4000 feet southeast in flowing through tester from Bend at 4052-61 feet and at 4061-71 feet. Pipe has been set for completion. It is about 10 feet low to the nearest and largest producer. The Denver firm will drill Gober 1 to try for a ¾-mile west extension to the 5-well area.

12-Story Los Angeles Building Planned by General Petroleum

General Petroleum Corporation, western affiliate of Socony-Vacuum Oil Company, plans to construct an office building starting July, 1947, which will represent an overall investment of $5 million. It will be a half block deep, fronting on Flower Street for an entire block from Sixth Street to Wilshire Boulevard. The building will have a street floor, and 12 additional stories. About 1200 employes will occupy the administrative offices and will have the use of a nearby garage building owned by the corporation. Some surplus floor space and street floor stores will be available for rent.

State Sells Leases

The Louisiana State Mineral Board has leased 285,775 acres of Gulf of Mexico bottoms and 5828 scattered land acres for a total of $3,166,288.12.

Highest bid on any individual tract was Humble Oil & Refining Company's $165,000 bonus on a 5000-acre tract in the West Delta area. Magnolia Petroleum Company's total exceeded $900,000.

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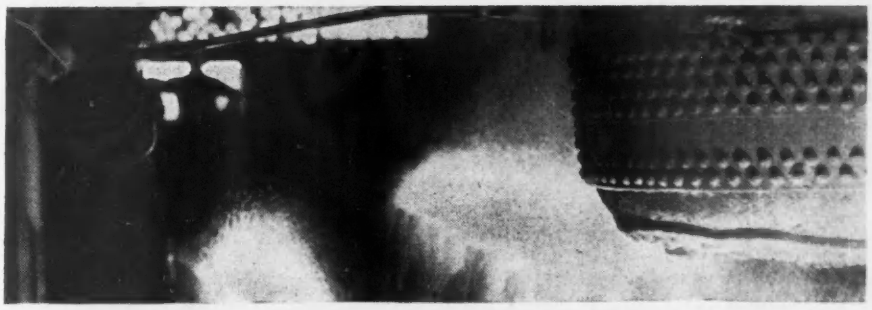

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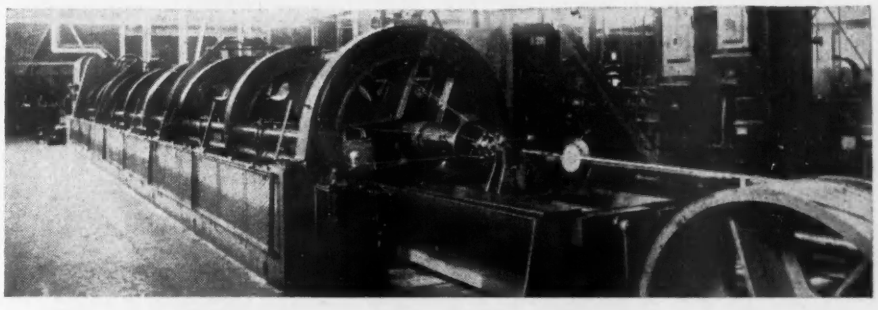

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☆ East Texas

Limestone County Test Yields Gas and Water From Pettit

Limestone County wildcat yields gas and water from Pettit; commercial producer indicated for Leon County Woodbine prospect; third failure looms for Mount Sylvan field.

Limestone County: C. W. Killough et al's Arnet 1-A, wildcat 5 miles northwest of Groesbeck, tested an undetermined volume of gas with considerable salt water from Pettit perforations at 5434-64 feet. Shutin pressure builds up to 830 pounds on tubing and 790 pounds on casing. Operator will make further attempt to exclude water. This wildcat was drilled to 5825 feet in Travis Peak, topped at 5563 feet.

Leon County: J. B. Daniel Oil Company's Cox 1, John Scritchfield Survey and 1½ miles west by south of an indicated Woodbine pumper in process of completion, was due to set pipe for completion after abandoning plans to deepen to the Edwards. The well flowed a small amount of oil via drill-pipe through hole full of mud from broken Woodbine at 7085-7447 feet. Electrical formation survey failed to indicate the presence of solid sand beds. United North & South Development Company's Oden 1, W. Martin Survey and possibly on the same structure, is credited with having reached water in the Edwards, and will try for completion in broken Woodbine at 6972-7236 feet, as this zone showed a small amount of oil and gas without water.

Smith County: Humble Oil & Refining Company's Pool 2, 1740 feet southwest of its Mount Sylvan field discovery, failed to encounter effective pay in coring the Paluxy series to 7328 feet. It is near the projected water level at this depth. The company's Clark 1, northwest outpost, was drilling shale and lime at 7080 feet and is showing for a high well on upper markers.

Cherokee County: Standard Oil Company of Texas' new Birmingham 1, Ironton prospect, entered the massive anhydrite at 8190 feet, and was trying to restore circulation at 8552 feet in anhydrite and lime.

Smackover Tests: The Texas Company's White 1, Freestone County, was drilling shale at 11,680 feet, having penetrated the Travis Peak. In Wood County, Amerada Petroleum Corporation et al's Coke Unit 2, Coke field, was drilling sand at 8680 feet in dry Travis Peak, topped at 8345 feet, and will change to 136-foot base derrick to facilitate deepening. Humble's McKnight 1, northeast edge of the Hawkins field, entered the Pettit at 9410 feet, and was drilling dry shale and hard sand. Shell Oil Company's Goldsmith 12, Quitman field, passed up oil production in the Paluxy, topped at 6246 feet, and was drilling at 6490 feet.

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Program Announced for INGA Annual Meeting

The 1946 annual meeting of the Independent Natural Gas Association of America will be held at the Blackstone Hotel in Fort Worth, Texas, November 22. The program scheduled for the meeting includes the following: The President's report, by E. Buddrus, INGAA president; "The Natural Gas Act," by Mark H. Adams, chairman of the Association Legal Committee, lawyer and independent producer of Wichita, Kas.; "Natural Gas and its Future," by Captain E. S. Pettyjohn, director, Institute of Gas Technology, Chicago; "Natural Gas Reserves," by Dr. E. DeGolyer of DeGolyer and MacNaughton, Dallas; "Problems of Transportation" by D. A. Hulcy, president, Lone Star Gas Company, Dallas; "The Producer's Problems," by Dr. Frank Dotterweich, Texas A & I College, Kingsville; "Viewpoint of the Royalty Owner," by Homer W. Long, Guymon, Okla., and "Regulatory Practices," by Judge P. A. Lasley, Little Rock, Ark.

Bureaucrats Buffet

More than 100 reservations have been received for the "Bureaucrats Buffet," planned for former members of the Petroleum Administration for War, during the API Chicago meeting. The affair will be held from 5 to 7 p.m., Tuesday, November 12, in the Tower Rooms, Stevens Hotel. Lee Cowles, 910 South Michigan Avenue, Chicago, is receiving reservations.

Refinery to Be Enlarged

Continental Oil Company will make additions costing $4 million to its Denver refinery within the next 16 months. Catalytic and other cracking units will be added. Work is to be completed early in 1948. Continental's plant now has a capacity of 4000 barrels per day.

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☆ East Texas Border

Panola County Carthage Field Gets ½ Mile East Extension

Gasser extends Carthage field ½ mile east; production from Hill zone indicated on southwest side of Carthage.

Panola County: Delta Drilling Company's Christian 1, A. Y. Nichols survey, was completed and rated good for 2 million cubic feet of gas daily from the Hill zone and 5 million cubic feet from the Lower Pettit. It widens production in the east limits of the Carthage field approximately ½ mile.

Stanolind Oil & Gas Company's Carthage Gas Unit 16, Runnel survey, showed gas along with distillate and cut mud on a drill-stem test of the Hill zone, indicating production from this horizon on the southwest side of the field, heretofore productive from lower zones only.

Harrison County: Placid Oil Company and Gulf Oil Company's Dunn 2, S. B. Simpson survey, Whelan gas area, is preparing to test at 8000 feet. It picked up gas shows around 6800 feet in the Rodessa.

E. C. Johnston's Page 1, southwest offset to his Cargill 1, flush oil producer-discovery on the west flank of the Waskom wet gas field, near Jonesville, is being closely watched while testing for production. Reputedly the offset has shown for gas in the Pettit at 5700 feet and for gas with distillate at 6230 in Travis Peak.

☆ South Central Texas

Atascosa County Charlotte Field Outpost Swabs Oil

Charlotte field outpost swabs oil; Imogene test shows oil; Muil field area wildcat abandoned; Sabinal wildcat below 3279 feet.

Atascosa County: The Bering Company's J. J. Koemel 1, outpost about 4900 feet southeast of Humble Oil & Refining Company's Johnson 1 well at Charlotte field, swabbed mud and oil from perforations at 5135-5210 feet. Total depth is 5263 feet and location is in the northeast corner of A. G. Neal Survey 266, A-643.

Humble's Courand 1-B, Imogene field, recovered 35 feet of oil on a drill-stem test at 7660-76 feet after a previous test at 7660-67 feet recovered mud. Another drill-stem test at 7672-79 feet recovered 30 feet of oil, 60 feet of muddy oil, and 70 feet of salt water. All tests were in the Edwards Lime.

Magnolia Petroleum Company's E. A. Kinsel 1, wildcat 12 miles southeast of Pleasanton and 6600 feet south-southwest of the Muil field, has been abandoned at total depth of 3010 feet. The well attempted to find production in the shallow Reklaw and Wilcox zones.

Uvalde County: Bennett & Sorrells' Mary Rehm 1, wildcat 10 miles southwest of Sabinal, is below 3279 feet in shale.

Texas Lease Auction

The 20th public auction of mineral leases on University of Texas lands has been set by the Board for Lease of University Lands for December 14, at 10 a.m. in Austin.

☆ Southwest Texas

Duval County Field Likely; Patel Outpost Tests Sand

New field in Duval County indicated; outpost at Patel, originally abandoned, making production test; second Yegua producer at Charco Redondo completed.

Duval County: Joe C. Palmer's Welder Heirs 1, wildcat a mile west of Seven Sisters field, has indicated a new field for the area. A drill-stem test in the Mirando sand at 2596-2600 feet recovered 460 feet of oil with no water in 15 minutes. Casing was then run for completion. This well is in Samuel Alexander Survey 102.

Jim Hogg County: Newman Brothers Drilling Company & F. A. Callery et al's Julian Vela Pena 1, southeast outpost test at Patel field, is testing a sand section at 1674-95 feet which was picked up on the electrical log and confirmed by sidewall cores. Operators abandoned the hole at 2977 feet, then decided to go back and take sidewall samples. The test is about 19 miles southwest of Hebbronville in Mrs. L. Bartlett Survey 589, A-33.

Zapata County: F. P. Schwab et al's Anastacio Garcia 2-A has been completed as the second oil producer in the Yegua horizon at Charco Redondo field. The well gauged 57.75 barrels of 26.7-gravity oil daily on pump from open hole completion at 1675-85 feet. Gas-oil ratio was 200/1.

☆ Lower Texas Coast

Live Oak County Given New Field Northeast of Lucas

New field opened northeast of Lucas field; 2 outposts at La Gloria being completed; new pay zones discovered at West Sinton and Midway.

Live Oak County: Henshaw Brothers & E. H. Smith's H. N. Schwartz et al 1 is an oil field discovery about 2 miles northeast of Lucas field. No gauge of the flow has been taken but the well flowed clean oil after successfully cutting off water intrusion developed in initial tests. Total depth is 4495 feet with casing perforated for completion at the 4020-foot level. This well is in the south corner of a 200-acre lease and about 8400 feet from the northeast line and 4400 feet from the northwest line of John McMullen Survey A-30.

Brooks County: Argo Oil Company's Birdie B. Riley 3-A has been completed in a new oil pay horizon on the south flank of La Gloria field. A drill-stem test of perforations at 6970-71 feet recovered 1000 feet of 42-gravity oil and operators ran tubing for completion. The well failed to produce oil in the regular oil pay zones farther up the hole, and was deepened to total depth of 7406 feet where liner was set for completion.

Jim Wells County: Magnolia Petroleum Company's Sharp Estate 1, outpost 5000 feet northeast of the nearest producer at La Gloria field, cleaned on ¼-inch choke from perforations at 7170-85 feet with 2100 pounds tubing pressure, and will probably make a gas-condensate well. Total depth is 7700 feet with 7-inch casing set to 7250 feet for completion.

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San Patricio County: Jones & Morgan's W. Ford 1 has been completed in a new pay zone at West Sinton field. From perforations at 3462-68 feet the well flowed 151.2 barrels per day net oil on ¾-inch choke, making 89.7 percent salt water with no gas. Total depth is 5231 feet.

F. M. Boykin's J. H. Hutto 3 has discovered a new pay zone at Midway field. From perforations at 5685-86 feet the well flowed on potential 164 barrels of 31-gravity oil daily through 9/64-inch choke and with tubing pressure 1060 pounds and gas-oil ratio 1380/1. Total depth is 6057 feet with 5½-inch casing set to 6052 feet.

Right-O!

The London Sphere points out that the U. S. has only 6% of the world's area and 7% of its people. Yet is has 60% of the telephones, 80% of the automobiles, 35% of the railroads. It produces 70% of the oil, 60% of wheat and cotton, 50% of copper and iron, 40% of coal and lead. It has eleven billion dollars in gold and two-thirds of the banking resources of the world. Pompous statesmen would now substitute their silly political economy for the individual initiative and management that created this bulging prosperity. And this, the London editor rightly says, is "just damn foolishness."

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☆ Upper Texas Coast

Test West of Pickett Ridge Is Prospective Pool Opener

New producing area in Wharton County indicated; confirmation test in deep producing horizon at South Hyatt completed; east flank test at Saratoga given potential; production extended ¼ mile at Lucky.

Wharton County: D. M. Wallace's J. W. Kubella 1, wildcat 1¼ miles east of the Lakeview field and a mile west of production at Pickett Ridge field, is a prospective field opener. On a drill-stem test of a saturated sand at 4700-14 feet the well flowed at the rate of 5 barrels of 25-gravity oil per hour with 500 pounds working pressure. Another test made in the 4500-foot level showed salt water. Total depth is 6000 feet with 5½-inch casing set to 4760 feet and perforated for completion at 4700-04 feet.

Tyler County: The Atlantic Refining Company's J. R. Dempsey 1, confirmation test in the deep producing horizon at South Hyatt, has been completed for a flow of 372 barrels of 49.9-gravity oil daily. Flowing pressure on tubing was 4160 pounds, shutin pressure 4700 pounds, and gas-oil ratio 11,352/1. Total depth is 10,326 feet with 5½-inch liner set on bottom and perforated for completion at 10,236-272 feet. This test is located in the L. A. Beard Survey, 2700 feet west-southwest of the Houston-American 1 discovery well.

Hardin County: Gulf Oil Corporation's R. S. Sterling Fee 1, east flank test at Saratoga field, has been completed for a potential flow of 160.77 barrels of 38.5-gravity oil daily through 3/16-inch choke with 555 pounds tubing pressure and gas-oil ratio of 845/1. Total depth is 5725 feet with casing perforated for completion at 5480-5591 feet.

Matagorda County: Stanolind Oil & Gas Company's Franz Huebner 4 has extended production ¼ mile south on the west flank of Lucky field. On potential the well flowed 128.77 barrels of fluid daily through 16/64-inch stroke, 40 percent water and the remainder 37.7-gravity oil. Tubing pressure was 300 pounds and casing pressure 1050 pounds. Total depth is 14,109 feet with 7-inch casing set to 11,674 feet and 5-inch liner at 11,524-12,109 feet.

☆ South Louisiana

New Sands Opened in Four South Louisiana Fields

New sands discovered in 4 South Louisiana fields; extension test at Golden Meadow having trouble with high pressure flow.

Acadia Parish: A. J. Bankhead et al's Charles Dischler 1, 3500-foot west extension in the North Richie field, has been completed in a new sand. From perforations at 9053-58 feet, the well flowed on potential 239 barrels of 32-gravity oil daily through ⅛-inch choke with 1850 pounds flowing pressure on the tubing and gas-oil ratio of 2500/1. Total depth is 9104 feet and the well is also credited with a gas sand show at 8470-85 feet.

Jefferson Parish: The Texas Company's George H. Kerner 6 has been completed in a new sand for Lafitte field. From perforations at 10,404-415

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feet the well flowed on potential 243 barrels of 36.5-gravity oil daily through ⅛-inch choke with 1250 pounds flowing pressure on tubing and gas-oil ratio of 856/1. Total depth is 10,759 feet with 7-inch pipe set to 10,540 feet. Saturated sands were logged at 10,391-426 feet.

Terrebonne Parish: British-American Oil Producing Company's A. M. Dupont Corporation 1 has been completed in a new sand and as the second producer at Lapeyrouse. The new deep sand logged at 12,640-685 feet flows from perforations in the casing at 12,654-62 feet. On potential gauge the well flowed 162 barrels of 52-gravity condensate daily through 12/64-inch choke with 3,365,000 cubic feet of gas. The Lapeyrouse field was discovered 5 years ago by Gulf Refining Company's Picou 1 and this is the first well completed in the field since the discovery well was finaled. Picou 1 produces a small amount of condensate from perforations at 10,883-894 feet.

Texas' State-Lake Pelto 50, on state lease 188 in Lake Pelto field, has been completed in a new producing sand for the field. From perforations at 12,397-415 feet the potential flow was gauged at 82 barrels of 47.4-gravity oil and 1,487,000 cubic feet of gas daily through 12/64-inch choke. Tubing pressure was 2100 pounds and gas-condensate ratio 15,853/1. Total depth is 12,602 feet.

Lafourche Parish: North of east flank production at Golden Meadow field, Barnsdall Oil Company's Tamplain & Talbot 1 has been having trouble with lines freezing due to high pressure flow from perforations at 10,010-018 feet. The lines froze and tubing broke on initial test about 10 days ago. Brought under control, the well was put on 9/64-inch choke and flowed 1½ hours when lines again froze. The well was then shut in to connect up high-pressure equipment. Flowing pressure on the tubing was 3725 pounds and shutin pressure 3850 pounds. Total depth is 11,501 feet.

☆ North Louisiana

Good Extension Completed For Hico-Knowles Area

Good extension for Hico-Knowles area completed; new gas-condensate field in prospect for Franklin Parish.

Lincoln Parish: R. W. Williams' Cooper 1, 25-20-4w, Hico-Knowles area, completed in the Bodcaw of the Cotton Valley series, bottomed at 8432 feet, is estimated good for 75 million cubic feet of gas and 50 barrels of distillate to the million cubic feet of gas. The well was drilled for W. C. Feazel, Shreveport independent operator, to whom the leases were assigned. It is 1½ miles northwest of The California Company's James 1, nearest production.

Franklin Parish: Discovery of a new gas and condensate producing field appeared in prospect as Atlas Oil and Refining Company's Ayer Timber 1, 26-14n-9e, made production test with casing perforated from 6570-86 feet, and shutin pressure 2400 pounds. Official gauge has not been reported.

Madison Parish: Atlas Oil & Refining Company has ordered an electrical survey for Edna M. Yerger 1, 50-16n-14e, wildcat 2½ miles southwest of Thomastown, which encountered a drilling break at 7863 feet and found a trace of oil in cuttings. Drilling was halted at 7869 feet.

Claiborne Parish: The Ohio Oil Company is perforating for production test at W. E. DeLoach 1, 22-23n-8w, possible second deep Smackover producer in the old Haynesville field. The well went to 10,740 feet. Smackover was topped at 10,016 feet. Operations indicate that 200 feet of this section will be gun perforated. The field's Smackover pay discovery was completed in April.

☆ Arkansas

Travis Peak Producer West Of Village Field Finaled

Travis Peak producer completed west of Village field production, Columbia County; wildcat 5 miles northeast of McNeil due for immediate test.

Columbia County: McAlester Fuel Oil Company's Alexander 8-1, NE SE 17-17s-19w, 1 mile west of the Village field production, was completed as the first Travis Peak producer in the area. Production is from 4333-38 feet, with casing pressure between 50 and 60 pounds. It is shut in pending building of tanks, but flowed 100 barrels of fluid through ¼-inch choke, 85 percent 35-gravity oil and 15 percent basic sediment and salt water. The Village field has producers from both the Smackover lime and Cotton Valley sand.

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A. Wynn 1, north and east of SWc 8-15-19, wildcat 5 miles northeast of McNeil, is scheduled to test the Cotton Valley. The well is reported down around 5800 feet. Same operator's Longino-Goode unit 1, 34-17-23, is reported below 6800 feet. It is near the McKamie field, east edge of Lafayette County, where pay is deeper than the present depth of this test.

Ouachita County: The Carter Oil Company's Dorothy Crowley 1, C SW NE NE 25-15s-18w, has been completed as the first flowing well in the old Gum Creek field. It gauged 61 barrels of 20.4-gravity oil during a 13½-hour test of the Tokio sand through 40 perforations from 2454-64 feet. The well is bottomed in Tokio at 2471 feet.

Mid-Continent Group Elects

New officers of the Mississippi-Alabama division of the Mid-Continent Oil & Gas Association were elected at the organization's annual membership meeting. W. W. Vaughey, independent oil operator of Jackson, was elected president, succeeding C. E. Morgan, also of Jackson. J. P. Evans of Jackson was elected first vice president and E. D. Kenna of Jackson was reelected executive vice president. Regional vice presidents elected were Dennis Granberry of Laurel, Robert Genin of Bay St. Louis, Bernie Imes of Columbus, and James L. Duffy of Grove Hill, Alabama.

☆ Mississippi

Wildcat Activity Increases; Forrest Test Below 15,675

Wildcat activity at new high for year; Forrest County prospect below 15,675 feet.

Forrest County: The Superior Oil Company's Cassie Bradford 1, C SW SW NW 1-3n-13w, deep wildcat, is drilling below 15,675 feet. It is also reported that 5½-inch casing has been set to 15,600 feet and that good showings of oil have been recovered from 2 sections of the hole, but this is without confirmation. It is understood that Superior is interested in several spreads in the vicinty of the Bradford and is tentatively considering the location of a test southwest of the present operation.

Lamar County: Gulf Refining Company's and R. A. Welch's John Q. Butler 1, 32-2n-16w, Baxterville outpost, was assured of production after a drill-stem test flowed oil. Tuscaloosa was perforated at 8821-98 feet with 460 shots and tubing pressure registered 170 pounds. Gravity of the oil was 14.1. Baxterville also added another successful completion at Sun Oil Company's F. M. Snowden 3, C SE NW 7-1n-16w, which flowed 560 barrels of oil per day on initial production test.

Issaquena County: C. H. Murphy Jr. and Sun Oil Company have located J. Atkinson SE SW 4-9n-8w. The operators drilled another test in SE SE 1-9n-8w, 2 years ago. The well was abandoned at 4620 feet in the Paluxy zone, but showings of very heavy oil were recovered from Gas Rock topped at 4008 feet.

Lincoln County: The California Company's Board of Supervisors 1, C NW SW 16-6n-8e, Mallalieu field, is running core tests below 10,472 feet after indi-

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cating top of Marine Tuscaloosa at 10,131 feet. Humble Oil & Refining Company's M. C. Randall 1, 17-6n-8e, in Mallalieu, is shut down temporarily after a drill-stem test yielded only mud, sand and salt water from the Wilcox zone between 3928-82 feet. Well is now bottomed in sand and shale at 9585 feet. Humble's Lincoln Board of Supervisors 1, C NE NE 16n-8n-5e, is drilling below 9061 feet in shale and lime with no shows reported. This wildcat ran a drill-stem test in the Wilcox at 4130-32 feet but recovered only muddy salt water.

Chickasaw County: Drilling will begin shortly on a test in C SE SW 24-12s-4e, about 6 miles northwest of Okolona, which will center interest again on the North Mississippi area. The latest well to be drilled in this section was Davidor & Davidor's Stone 1, C SE SE SW 29-12s-5e, abandoned in June at 2441 feet after driller was unable to shut off entry of water. Showings of oil recovered at 2520-2505 feet from the Stone were insufficient for commercial development.

Alabama

The Carter Oil Company's Rex Alaman 2, SW NE NE 4-10n-3w, Gilbertown field, Choctaw County, received encouragement with the recovery of 9 feet of oil sand from cores of the Eutaw at 3130-47 feet. Tests continue.

Madison County: Stephens, Tr.'s Jeanette Woody 1, C SW NW 1-6s-2e, wildcat, is shut down at 310 feet after encountering slight shows of oil at 210 feet.

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☆ Ohio

Columbiana County Oriskany Sand Pool Test Logs Gas

Oriskany gas found in Columbiana; La Grange has gas extension; 2 oil completions noted at Hemlock Grove; North Jackson extended; Black Fork well is failure.

Columbiana County: On an inside location in the Oriskany sand pool in Madison Township, L. B. Smith's Unit 1, NE SW 14, logged sand at 4317-31 feet with 4¼ million cubic feet of gas.

Lorain County: In a ¼-mile move north and east of the La Grange pool, the Ohio Fuel's Biggs-Butcher Consolidation, Lot 74, came in at 2¼ million cubic feet natural. Clinton sand was reported at 2426-37 feet. Tubing was dropped in the well and not fished out, but connected and turned into the line.

Meigs County: Preston Oil Company completed 2 wells in Hemlock Grove pool. Valentine 2, SW SW 33, Orange Township, swabbed 25 barrels from the Berea sand at 1779-94 feet and H. R. Cook 5, SE SE 2, Bedford Township, swabbed 26 barrels from Berea at 1599-1616 feet.

Ashland County: The Ohio Fuel moved ⅓ mile south to complete a well on M. E. Dickinson SE NE 3, Jackson Township. Clinton sand, logged at 2829-47 feet, made 650,000 cubic feet natural.

Gallia County: Portage Producer's attempt to extend the Black Fork pool 1½ miles southeast found the Clinton, 3053-73 feet, dry on John Evans SW NE 20, Greenfield Township.

☆ Michigan

25 New Starts Reflect Brisk Activity as Bad Weather Nears

Twenty-five new starts, including 8 wildcats, reflect improved activity, with many operators attempting to complete exploratory programs before adverse weather.

Starts also include 8 gas locations in the Winterfield field, Clare-Osceola counties, where a 250-well program is under way to convert the field for storage of Texas gas. Consumers Power Company, which previously had purchased an interest in the field from Taggart Brothers Company, now is purchasing the royalty to gain full ownership as a necessary step in the storage program. Company has a schedule of 60 wells for completion by January 1. Wells average 1300 to 1500 feet deep.

Mecosta County: Rand and Neyer's Curtis 1, SE SE NW 27-15n-10w, logged Dundee lime objective at 3434 feet and drilled out dry at 3635 feet. Another closely watched wildcat, Merrill and Hanner's Stephenson 1, SE NW NE 12-13n-10w, was bottomed at 3547 feet. Test showed 16 feet of dense oil-saturated lime formation from 3490 feet.

Allegan County: Circle Drilling Company's Gile 1, SW SW SW 9-1n-14w, carried a free oil show at 1290-92 feet in Traverse lime and will be acidized. The wildcat is 4 miles west of a recently completed 15-barrel outpost producer in 7-1n-13w, Trowbridge Township.

☆ Illinois Basin

Three Discoveries Registered For Wabash County, Illinois

Three discoveries for Wabash County, Illinois.

Illinois

Gilliam and Aspin's Herring 1, NE NE SW 27-1s-14w, Wabash County, flowed 200 barrels of oil in 24 hours, natural, after plug was drilled to open a new area 1 mile east of the Brownsville pool. Pay was found at 2965-70 feet in McClosky lime.

Sam Malis' Fite 1, NE NE NW 7-1n-13w, midway between the Lancaster and West Lancaster pools, was completed for 900 barrels of oil daily, natural, from McClosky lime at 2815-20 feet.

Hayes and Wolfe's Meyer 1, SW SW NW 8-1s-13w, 3 miles southeast of the Friendsville field, pumped 190 barrels of oil in 24 hours, initial test, from Bethel sand at 2560-70 feet, after a 40-quart shot. The well is a semi-wildcat.

Jasper County: The Superior Oil Company's Worcester 1, wildcat in SE NW SE 8-5n-9e, is drilling below 1675 feet.

Lawrence County: McCummings Oil Company's Updike 1, W½ SW SE 25-5n-13w, wildcat 4 miles from production, is testing and cleaning out McClosky lime at 1721-27 feet.

Hamilton County: Inland Producers and others' Biggerstaff 1, NE SW SW 5-6s-6e, a mile west of the Hoodville pool, swabbed 170 barrels of oil, natural, in 24 hours from Aux Vases sand at 3159-74 feet.

Clark County: Frank Hesler's Buckler 1, SW SE NW 36-12n-14w, wildcat, was shut down for orders at 840 feet.

Kentucky

Hoosier Drilling Company's Dempewolf 1, 13-P-27, Henderson County, deep test in the Birk City pool, has been abandoned as dry at 4200 feet. The Devonian lime was topped at 3,555 feet. No shows were encountered.

☆ Rocky Mountain Area

Big Horn County, Wyoming, Test Deepening to Dakota

Big Horn County, Wyoming, test deepening to Dakota; Park County Madison lime discovery continues tests; Continental plugs back Weber sand discovery at Elk Springs, Moffat County, Colorado.

Wyoming

MacKinnie Oil & Drilling Company, Denver independent with holdings throughout Wyoming oil fields, is deepening its South Garland wildcat, Sheridan Flour Mill 1, NE NE NE 15-55n-97w, Big Horn County, from the Frontier formation at 3745 feet, total depth, into the Dakota horizon at around 4500 feet. Both of these formations produce gas in the Garland field proper, 3 miles north.

Park County: At Elk Basin, Stanolind Oil & Gas Company's 38-M, NE SE NE 24-58n-100w, Madison lime discovery, continues testing in the lower section of the Madison after running 5-inch liner to 4680 feet. The well flowed 9½ barrels of 31-gravity oil on initial test, but a small gas leak was found in the liner. When the well was reconditioned and packer rerun it was necessary to swab

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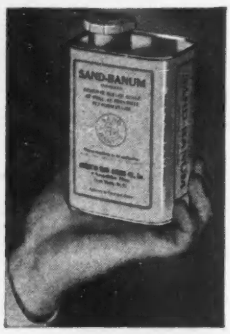

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the well and 30 barrels of oil was recovered in 15 hours, swabbing 800 feet off bottom. Madison was topped at 4350 feet and the more porous section was cased off by the liner. The lower section will be acidized and the upper zone then perforated before the well is completed. Numerous drill-stem tests were taken as the well drilled the Madison section and the most favorable was between 4560-4610 where 2400 feet of oil was recovered on 1½-hour test.

Resolute Oil Corporation of Great Falls, Mont., which has spent much money in developing the Badger Basin field on the Montana-Wyoming line, apparently has a Frontier sand failure at Northern Pacific 9, C NW SE 7-57n-101w The well was drilled to 8393 feet, and had only a small show of gas in Frontier at that depth. The well is a west offset to Northern Pacific 8, completed 6 months ago for 1800 barrels of oil per day through choke. Faulted conditions on the northwest side of the field are responsible for the failure. Resolute has 6 deep producers in the field making approximately 700 barrels of oil per day which is refined and sold locally.

Colorado

Continental Oil Company is plugging back its Weber sand discovery at Elk Springs, Smith 1, in NW SE SW 30-5n-98w, Moffat County. The well was at 6231 feet and has been cemented back to 6145 feet and plastic plug run topped at 6140 feet. This well looked good on drill-stem test in the Weber, topped at 6087 feet, but made water on tests below 6145 feet. At 6231 feet, total depth, the well swabbed 240 barrels of water and 100 barrels of oil in 24 hours.

Prowers County: The Ohio Oil Company entered the wildcat drilling play in Southeastern Colorado with announcement of a location on the Two Buttes structure. The well is Eldridge 1, NW NW SW 25-27s-46w, a mile east of a well drilled in 1926 to 5021 feet, where it was abandoned in lower Pennsylvanian beds. Ohio has about 80,000 acres in this area. The block was taken on possibilities of oil accumulation against a volcanic plug. This test almost centers the activity in Southeastern Colorado. Sharples-Huber-Frontier companies are drilling their second wildcat on a 125,000-acre block 30 miles west along the Baca-Las Animas county line; Skelly Oil Company is drilling below 4200 feet on a wildcat south of Springfield; and The California Company is drilling at 4300 feet at Smith 1, in the Wiley area, 5 miles north of Lamar in Prowers County.

☆ Canada

Lone Rock Discovery Appears Equal to Any Well in Area

Husky Refining Company's Oil & Gas Development 4, Lone Rock (Saskatchewan) discovery in lsd 4 14-47-27w3, was bailing gassified 14-15-gravity crude at a rate of 200 barrels daily, with fluid level holding steady over 1100 feet above bottom. Well is bottomed at 1833 feet with seven-inch casing set to 1825 feet, at top of Sparky sand of the Lower Cretaceous. Plug was drilled October 31 and the initial day's bailing gave a 100 barrel daily rate with fluid level 200 feet off bottom. As formation cleared, influx rate increased and fluid

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column rose to 1100 feet despite stepped-up bailing rate. Pump will be installed shortly. The discovery is 12 miles southeast of the former limits of the Alberta-Saskatchewan border field of Lloydminster, and appears the equal of any well in that field.

Husky-Oil & Gas Development 3, lsd 2 28-47-27w3, 2½ miles northwest of the No. 4 discovery, has deepened beyond the Sparky sand to core 2 more oil-bearing sands in the Lower Cretaceous, and brighten "deep" prospects for the general Lloydminster-Lone Rock area. No. 3 picked up the Sparky sand between 1880-88 feet (giving a 180-foot oil rise in 1-hour drill-stem test), cored on to find oil-bearing sands interbedded with shale streaks from 1890 to 1934 feet, and oil-saturated sand from 1997-2012 feet. Packer failures prevented test of these deeper sands, but core analysis indicated commercial probabilities. After deepening to top of Devonian lime at 2252 feet, well was plugged back to 2030 feet, and seven-inch casing set to that level. Casing will be perforated opposite the 3 oil-bearing sands.

Withers-Lone Rock 1, lsd 13 6-47-26w3, 2½ miles southeast of the Husky No. 4 Lone Rock discovery, indicates further extension of the Lower Cretaceous oil sands to a total length of 26 miles from northwesterly production in the Lloydminster (Alberta) area. This Saskatchewan venture topped Lower Cretaceous at 1569 feet, first oil saturation at 1763-68 feet, and a well-saturated sand at 1782-90 feet, where coring was halted and seven-inch casing run to 1774 feet. Plug was being drilled, with commercial production indicated.

Dorsey Hager, geologist of Centralia, Ill., will spend the winter at Lloydminster, initiating a development program calling for 20 wells backed by a Chicago group, represented by W. R. Jeffery, B. F. Bills and R. O. McKee, which has acquired a block of 7760 acres on the Alberta side of that field. Four wells, all productive, were drilled on the block during 1943-44, by the original owner, Burrows & Sparks of Winnipeg, Man.

South Princess Syndicate 3, lsd 12 8-19-11w4, indicates commercial oil production in the first test in the 6-mile stretch separating Madison limestone production in the South Princess area, southern Alberta Plains. The well gave a rise of 930 feet of gassy oil (25 to 28 gravity) and 30 feet of drilling mud in a 1-hour drill-stem test through 4½-inch pipe from top of Madison lime. Lime was topped at 3320 feet, with porosity showing to total depth 3326 feet. Seven-inch casing has been set at 3319 feet.

Roxana Oils 3K, Central Alberta Foothills wildcat in lsd 7 31-27-6w5, has been lost at 5560 feet due to a rare underground movement of considerable severity in a fault zone from 2790-2970 feet. The land slip, which occurred after drilling had been carried to 5100 feet, 10¾-inch casing run and set to 4992 feet, and a change made from cable to rotary tools, caused a major directional deviation and a severe bend in the casing at 2919 feet. After 3 successive twist-offs during rotary drilling to 5560 feet, directional survey revealed a "corkscrew" in the casing between 2880 and 3060 feet. It was decided to suspend the well and drill a completely new test 1100 feet to the east. Roxana 4K, in lsd 8-31-27-6w5, is now starting with heavy duty rotary.

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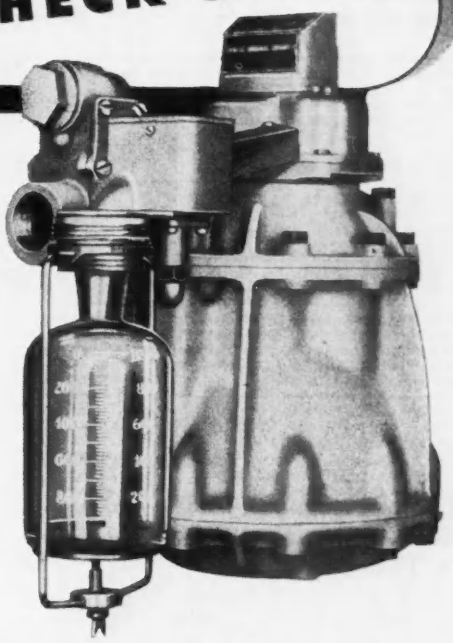

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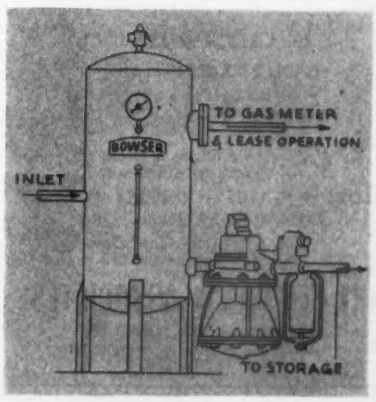

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ALABAMA WILDCATS

Choctaw County — Failure: H. L. Hunt's Emma Jones 1, c sw se 20-11n-4w, abnd 10-26-46 at 4335.

CALIFORNIA WILDCATS

Kern County—Failures: Clyde Oil Co.'s Hopkins 56-8, 8-29s-21e, S. Belridge area, abnd 10-29-46 at 3909.

The Petrol Corp.'s KCL-Claire 5, 13-28s-28e, Round Mt. area, Pyramid Hills 2242, Vedder 2347, abnd 10-27-46 at 2360.

Stanislaus County — Failure: Tide Water's Overton 34-16, 16-3s-7e, Ripon area, abnd 10-31-46 at 6054.

Solano County — Failure: Peter Cook, Jr.'s Upper Unit 2, 15-5n-3e, Rykers Island area, Green Sand 4008, Capay 4180, Hamilton 4634, abnd 10-22-46 at 5000.

Orange County—Failures: General Exploration Co.'s Marshburn 1, 23-3s-9w, Yorba Linda area, abnd 10-26-46 at 5466.

A. W. Lyddon, Operator's Crew Community 1, 32-5s-10w, Huntington Beach area, abnd 10-29-46 at 9752.

Tide Water's Aldrich Fee 1, 13-6s-11w, W. Newport area, abnd 10-29-46 at 5044.

Monterey County — Failure: Texas Co.'s Cooper 1, 19-21s-9e, San Lucas area, abnd 10-30-46 at 3094.

ILLINOIS WILDCATS

Clay County — Failure: Lohman-Johnson Drlg. Co.'s Valbert 1, nw nw sw 11-2n-6e, abnd 3206.

Clinton County—Oil Discovery: J. L. Garard's Vieregge-Mahlandt 1, sw se nw 7-3n-2w, pump 17 bbls fr Bethel 1138-46, td 1146.

Cumberland County—Failure: Milo Ritchie's Sims 1, se ne ne 34-11n-10e, abnd 580.

Gallatin County — Failure: W. O. Allen's Wilson 1, se se nw 31-7s-10e, abnd 3012.

Hamilton County—Failure: Tex Harvey Oil Co.'s Vinyard 1, nw sw sw 23-5s-7e, abnd 3560.

Jasper County—Failure: Fryer & Simpson's Johnson 1, nw nw sw 26-6n-9e, abnd 3180.

Union County—Failure: C. A. Mitchell's Fly 1, nw sw ne 9-11s-1e, abnd 1727.

INDIANA WILDCATS

Floyd County—Failure: J. W. Griest's Ruffing 1, 33-1s-5e, abnd 1775.

Vigo County—Failure: J. A. Van Horn et al's Leach 1, 36-11n-9w, abnd 625.

KANSAS WILDCATS

Gove County—Failure: Ray B. Phelps' Wilson 1, ne ne ne 16-12s-30w, abnd 3878.

McPherson County—Failure: W. L. Hartman's College 1, c n½ nw nw 20-20s-1w, abnd 3655.

Norton County—Failure: Sohio et al's Reeves 1, ne ne sw 3-2s-22w, abnd 3755.

Rice County—Failure: Royer & Farris' Link 1, nwc 9-20s-10w, abnd 3415.

Trego County — Failure: Republic Natural Gas Co.'s Hille 1, se se sw 23-15s-24w, abnd 4295.

KENTUCKY WILDCATS

Daviess County—Oil Discovery: Fox & Fox's Grant 1, 15-P-28, flow 80 bbls oil, 1 mln gas fr Tar Springs, 1225-40, td 1935.

McLean County—Failure: Francis D. Wicker's West 1, 21-L-27, abnd 395.

NORTH LOUISIANA WILDCATS

Caddo Parish—Failures: Richard W. Norton's Collins 1, c ne se 4-22n-15w, Paluxy 2815, abnd 10-19-46 at 2981.

Joe M. Burnham-N. R. Royall's Noel Unit 1, se nw 11-19n-16w, Massive 4214-85, Hill 4505, Gloyd 4685, Dees 4730, Young 4812, James 4993, Three Fingers 5320, Pettit porosity 5440-68, Travis Peak 5621, abnd 10-24-46 at 5691.

Madison Parish — Failure: Murphy-Sun's Ashley Plantation 1, 536 fr sl 496.3 fr el 13-17n-10e, Gas Rock 3415, Massive anhydrite 4730, abnd 10-17-46 at 4764.

Richland Parish — Failure: Houston Oil-British-American's E. C. Godfrey et al 1, se nw 25-16n-6e, Midway 1946, Tuscaloosa 2410, Glenrose 2924, anhydrite stringer 3305, abnd 10-24-46 at 3316.

SOUTH LOUISIANA WILDCATS

Acadia Parish—Failure: Barnsdall Oil Co.'s Ozeman Young 1, n 70° 34 min w 2970, s 19° 26 min w 330 fr nec 31-7s-2w, between Tepetate and W. Tepetate flds, abnd 10-29-46 at 9450.

Ascension Parish—Failure: Atlas O&R Co.'s Wheeler & Wortham 1, 6930 s 68° 45 min e th 513 n 51° 45 min e fr nwc sect 49 in 48-10s-14e, abnd 10-28-46 at 9627.

SOUTH LOUISIANA NEW PAY TESTS

Acadia Parish — N. Ritchie Oil Discovery: A. J. Bankhead et al's Chas. Dischler 1, 2440 n 0° 13 min w th 2758.5 w fr sec 17-7s-1w, 3500 w extension, pay 9051, perf 30 shots 9053-58, flow 239 bbls 32-gr oil, 0.2% wtr, 8/64-in, gor 2500/1, tp 1850 lbs, comp 10-14-46 at 9104.

Jefferson Parish — Lafitte Oil Discovery: Texas Co.'s Geo. H. Kerner 6, 2438.3 n 1653.9 e of swc 22-17s-24e, pay 10,391-426, perf 60 shots 10,404-415, flow 243 bbls 36.5-gr oil, 0.1% wtr, ⅛-in, tp 1250 lbs, comp 10-17-46 at 10,759.

St. Martin Parish—Section 28 Oil Discovery: Gulf's Ruth Fleming et al 3-A, 1628.7 s alg el sect 28 fr nec same th 401.2 w at ra to sd line in 28-9s-7e, pay 10,691, perf 264 shots 10,698-742, flow 491 bbls 33.1-gr oil, 0.1% wtr, 3/16-in, gor 881/1, tp 1600 lbs, comp 10-19-46 at 13,123.

Terrebonne Parish—Lake Pelto Oil Discovery: Texas Co.'s State-Lake Pelto Lse 188-50, 687 n 7464 e of swc sect 17 in 16-23s-18e, pay 12,393, perf 54 shots 12,397-415, flow 82 bbls 47.4-gr oil, 1,487,000 gas, 12/64-in, gor 13,853/1, tp 2100 lbs, comp 10-28-46 at 12,602.

Terrebonne Parish — Lapeyrouse Distillate Discovery: British-American's A. M. Dupont Corp. 1, 345.8 s 578.4 w of nec 15-20s-18e, 12,640-685, perf 48 shots 12,654-662, flow 162 bbls 52-gr dist, 0.1% wtr, 3,365,000 gas, 12/64-in, gor 20,772/1, tp 3950 lbs, comp 10-25-46 at 13,879.

MICHIGAN WILDCATS

Gratiot County—Failure: Smith Pet. Co.'s Shankel 1, se sw se 33-12n-1w, abnd 10-26-46 at 1194.

Lake County—Failure: Byron MacCallum's Tope 1, nw sw sw 22-17n-12w, abnd 10-27-46 at 3468.

Mecosta County—Failures: Merrill and Hanner's Stephenson 1, se nw ne 12-13n-10w, Dundee 3337, abnd 1025-46 at 3547.

Rand and Neyer's Curtis 1, se se nw 27-15n-10w, Dundee 3434, abnd 10-28-46 at 3635.

Missaukee County—Failure: Freeman Oil Co.'s Smith 1, ne nw nw 8-24n-7w, abnd 10-29-46 at 4520.

Newaygo County—Failure: H. E. Walton's Schuitman 1, se se se 16-13n-14w, abnd 10-27-46 at 2300.

Oakland County—Failure: Mihkel Sherman's DeLinde 1, nw nw nw 21-4n-9e, abnd 10-23-46 at 303.

Wexford County—Failure: Sun's Dill 1, ne ne sw 28-21n-10w, Dundee 3788, abnd 10-30-46 at 4020.

MICHIGAN NEW PAY TEST

Isabella County — Mt. Pleasant Failure: Roosevelt Oil Co.'s Gibson 1, w½ sw nw 12-14n-3w, Richfield 4233, td 4805, pb 3581, recomp 10-29-46 in Dundee for 10 bbls.

MISSISSIPPI WILDCATS

Adams County — Failure: Ohio's Geo. W. Armstrong 1, 12-5n-3w, Wilcox 4645, Chalk 9200, Eutaw 10,275, Massive sd 10,985, abnd 10-26-46 at 11,083.

Covington County—Failure: Sippiala Corp.'s Leroy Magee 1, ne ne 21-8n-17w, Cap rock 2137, abnd 10-16-46 at 2195.

Greene County—Failure: Humble's W. W. Green 1, c se sw 27-2n-6w, Wilcox 2306, Eutaw 6810, L. Tuscaloosa 7970, Massive sd 8100, abnd 10-28-46 at 9200.

Madison County — Failure: Magnolia's G. Heindl 1, 21-9n-3e, Selma 4637, Eutaw 5662, Tuscaloosa 6250, Massive sd 6917, abnd 10-25-46 at 7483.

MISSOURI WILDCATS

Caldwell County—Failure: Todd & Luering's Benson 1, nw ne nw 30-55n-29w, abnd 1306.

Vernon County — Failure: G. Waymire's Olive 1, c sw se 30-37n-32w, abnd 400.

OHIO WILDCATS

Gallia County—Failure: Portage Producers' John F. Evans 1, sw ne 20, Greenfield Township, abnd 10-24-46 at 3208.

Lorain County—Failure: Ohio Fuel Gas Co.'s C. H. Feirtag 1, Lot 72, Eaton Township, abnd 10-23-46 at 2562.

OKLAHOMA WILDCATS

Carter County—Failure: C. W. Tomlinson's Hollingsworth 1, sw nw nw 26-5s-1e, abnd 400.

Cotton County—Failures: Kingery Brothers' McMahon 1, nw nw nw 33-1s-11w, abnd 2510.

J. W. Baldwin's Watkins 1, ne ne nw 29-2s-10w, abnd 2508.

Whatley & Barbre's Parrish 1, ne nw ne 13-2s-12w, abnd 2368.

C. P. Burton's Branth 1, nw sw nw 18-3s-11w, abnd 2015.

A. W. Whitaker's Zwelaker 1, ne se nw 20-3s-12w, abnd 2263.

Fortex Oil Corp.'s Stanford 1, nw sw ne 5-5s-12w, abnd 2301.

R. L. Fisher's Dugan 1, nw sw sw 5-5s-12w, abnd 2157.

Hughes County—Oil Discovery: B. C. Deardorff's Miller 1, se se se 5-7n-9e, flow 60 bbls fr Booch 2858-82, td 2882.

McClain County — Failures: Mid-Continent Oil Corp.'s Henderson 1, se ne nw 14-5n-2w, abnd 7223.

Lewis Oil Co.'s Gordon 1, se se ne 21-7n-2w, abnd 5989.

McIntosh County—Failure: Texola Drlg. Co.'s Cannon 1, c ne se 7-11n-17e, abnd 1941.

Osage County—Failure: Ohio Oil Co.'s Osage 1, se sw sw 1-22n-11e, abnd 2104.

Payne County—Oil Discovery: Fleet & Roodhouse's Ball 1, ne ne sw 10-18n-3e, flow 60 bbls fr Bartlesville 3931-49½, td 3949½.

Pontotoc County—Failure: J. W. Dillion's Byrd 1, ne se sw 35-3n-7e, abnd 2750.

Seminole County—Failures: Sohio's Reed 1, se se nw 29-10n-7e, abnd 3785.

Kingery & Patterson's Davis 1-A, ne nw se 10-11n-8e, abnd 3617.

WEST TEXAS WILDCATS

Andrews County—Failure: Mid-Continent's

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Winkler County—Failure: Dunigan Bros.-F. T. Brahaney's Sealy-Smith-Stanolind 1, c ne ne G&MMB&A 86, blk A, elev 2684, anhy 850, base salt 2250, Yates 2445, Glorietta 4880, Tubb 5970, abnd 11-1-46 at 6570.

WEST TEXAS OUTPOST

Hockley County—Levelland Extension: W. V. Ballard-J. J. Cody's Talley-Skelly 1, 440 out swc labor 17, Lge 733, State Capitol Lands, 1⅛ mi ne prod, elev 3547, San Andres 3740, pump 147 bbls oil, 10 bbls wtr, 10,000 gals acid San Andres open hole 4765-4845, comp 10-22-46 at 4845.

WEST CENTRAL TEXAS WILDCATS

Erath County — Failure: McCarthy O&G Corp.'s Hedrick 1, 2790 snl 1400 ewl of Jesse Benton sur, elev 1041, Bend 4105, Marble Falls 4183, Ellenburger 4628-6446, Cap Mountain 6660, Hickory sd 7002, abnd in granite 10-29-46 at 7165.

Jones County—Failure: Dave Bennett and J. W. Sorrells' Carter 1, 330 out nec labor 27, Lge 339, Austin-Williams sur, elev 1656, jkd 10-30-46 at 805.

Shackelford County—Failure: Roeser-Pendleton's Cook 2-A-36, 220 out nec se nw ETRR Co. sect 36, abnd 10-15-46 at 1243.

WEST CENTRAL TEXAS NEW PAY TEST

Jones County—Deep Failure in Shallow Pool: Crown Central Pet. Corp.'s Butler 1, 330 wel 5400 nsl Wm. Littlefield sur 282, elev 1857, Noodle Creek 2506, base Saddle Creek 2758, Flippen 2796, Gunsight 3054-3120, Swastika 3185, Palo Pinto 4490, abnd 10-28-46 at 4666.

NORTH TEXAS WILDCATS

Archer County—Failures: Geo. W. Cooper et al's W. H. Taylor 1-D, 330 out nec sect 15, ATNCL sur, elev 1041, KMA lime 3807, Bend 4725, abnd 10-30-46 at 5057.

Harvey Drlg. Co.'s C. L. Abercrombie 1-G, 1500 nsl 750 ewl blk 62, J. W. Harris sbdn, abnd 10-8-46 at 1499.

Reno Oil Co.'s Netherton 2-B, 2350 nsl 1950 wel blk 4, sect 95, ATNCL sur, elev 1058, abnd 10-17-46 at 1573.

Trumter Pet. Corp.'s Ream 1, 200 snl 600 ewl blk 103, J. W. Harris sbdn, abnd 9-12-46 at 1503.

Trumter Pet. Corp.'s Ream 2, 945 snl 915 ewl blk 103, J. W. Harris sbdn, abnd 10-22-46 at 1503.

Clay County—Failure: Gus Blakely et al's B. V. Engle 1, 150 nsl 780 ewl of 200-ac lse, 780 ewl 1250 snl Orange CSL sur, Gunsight 728, abnd 10-28-46 at 1004.

Cooke County—Failures: J. H. Fisher et al's Wilson 1, 800 snl 1000 wel S. D. Brown sur, abnd 10-25-46 at 2273.

Hollandsworth Drlg. Co.-U. Tex Oil Co.'s Pace 1, 330 out sec nw¼ Thos. J. Rusk sur, Ellenburger 1651, abnd 10-28-46 at 1753.

Wichita County—Oil Discovery: Texas Co.'s Ed. Foster 2, 1025 n 330 w of swc TE&L Co. 831, but in Stephen Dennison sur, elev 1109, Ellenburger 3145, pump 24 bbls Cisco sand 1885-95, ripped cas and shot 15 qts nitro 1885-95, td 3200, pb 10-29-46 at 1897.

NORTH TEXAS NEW PAY TESTS

Archer County—Manning-Nichols L. Strawn Oil Discovery: Fred M. Manning's 1st Evangelical Church Unit 1, 1263 snl 330 ewl H&TC Ry. 10, blk 1, elev 1009, KMA lime 4134, Strawn sandy-lime pay 4387-4410, shot 75 qts 4390-4410, pump 150 bbls, comp 10-28-46 at 4410.

Young County — Shallow Oil Discovery in Mississippi Area: L. T. Burns et al's Ellis 2, 450 snl 1400 ewl of s½ TE&L Co. 207, elev 1153, pump 9.4 bbls Cisco sand 764-72, comp 10-14-46 at 772.

EAST TEXAS WILDCAT

Kaufman County—Failure: Barron S. Barnes et al's Coleman 1, 330 ewl 660 snl of 210-ac tr, 3500 wel 660 snl J. J. Trevino sur, elev 389, Woodbine 3674, Georgetown 4360, Paluxy 5506, abnd 10-26-46 at 5631.

SOUTH CENTRAL TEXAS WILDCATS

Atascosa County — Failure: H. R. Smith-Skinner & Eddy Corp.'s Mrs. Ada Tom 1, 1400 fr nel 3160 fr sel John Benson sur 148, on 1515.9-ac tr, 9000 nw Fashing prod, abnd 10-25-46 at 3678.

Bexar County — Failure: H. S. Stahl's C. Koehler 1, 150 fr nl 400 fr wl 40-ac lse, lot 30, 5400 fr nl 6200 fr wl N. Montoya sur 21, 2 mi n Eckert fld, abnd 8-15-46 at 852.

Edwards County—Failure: Dan Auld's Hal & C. V. Peterson 1, 660 fr w&sl 160-ac lse, se¼ AB&M sur sect 16, blk 2, abnd 10-17-46 at 4500.

Gonzales County—Failure: K. D. Owen-G. D. Beauchamp's Frank Kunetka 1, 467 fr n&nel 1320 fr w&nwl J. D. Kirkpatrick sur, 320-ac lse, Reklaw 2929, abnd in Wilcox 10-26-46 at 6655.

SOUTHWEST TEXAS WILDCATS

Duval County—Failure: Santa Clara Oil Co.-Progress Pet. Co.-Producers Corp. et al's Mary D. Meaney et al 1, 2310 fr n&wl 1500-ac lse, Diego Hinojosa Gr, abnd 10-24-46 at 4152.

Jim Hogg County—Failure: Newman Bros. Drlg. Co. et al's Julian Vela Pena 1, 330 fr s&el lot 32, M. W. White sbdn, Mrs. L. Bartlett sur 589, El Peyote Gr, Patel area, abnd 10-24-46 at 2977.

McMullen County — Failure: C. H. Lewis-Chas. Daubert's Ellen Atkinson 1, 330 fr sl 1650 fr el 80-ac lse, and n½ AB&M sur 125, 3 mi n ne Loma Alta fld, abnd 10-22-46 at 2018.

Webb County—Failure: Ross & McCartney's E. T. Laubscher 1, 330 fr ne&sel lot 29 on 2981-ac lse, Joaquin Galan sur 2292, 6 mi w Cactus, abnd 10-24-46 at 4770.

LOWER TEXAS COAST WILDCATS

Bee County—Failure: H. H. Howell's A. E. Moreman 1, 330 fr nw&swl 117.67-ac lse, J. T. Malloy sur, 1 mi n Skidmore, 40-ac lse, abnd 10-22-46 at 5008.

Kleberg County—Failure: Stanolind's J. O. Johnson 1, 330 fr n&wl lot 12, blk 30, Kleberg Town & Impr. Co. sbdn, Juan Mindiola Gr, 2 mi nw Ricardo fld disc, on 215-ac lse, abnd 10-28-46 at 8895.

Nueces County—Gas Discovery: Jack Little, Tr.'s Mrs. E. V. Rieber 1, 467 fr s&wl 60-ac lse and 400-ac tr in J. J. de la Garza Montemayor & Sons Gr, 1 mi n Richard King fld, pay 5150, perf 30 shots 5150-55, flow 9,040,000 gas, ½-in, tp 1140 lbs, comp 10-15-46 at 5797.

Willacy County — Failure: Humble's Sauz Rch.-Tenerias 1, 45,550 e of wly/wl 10,000-ac lse, in sh 64, San Juan de Carricitos Gr, 6½ mi n ne Willamar fld, abnd 10-23-46 at 12,501.

UPPER TEXAS COAST WILDCATS

Brazoria County—Failure: Lee Bros. Oil Co.-Shuart et al's R. T. Schwartz 1, 601.15 fr nl 542.6 fr el lot 6 HT&B sur, on 29.2-ac tr, 1 mi nw Pearland twnst, abnd 10-25-46 at 5642.

Harris County—Failure: Sun's Independence Gardens Unit 1-A, 623.4 fr sl 778.5 fr el sect 6 WCRR sur, H. H. Goldsby 5-ac tr on 36.27-ac unit, W. Fairbanks area, abnd 10-25-46 at 8240.

UPPER TEXAS COAST NEW PAY TEST

Hardin County—Saratoga E. Flank Oil Discovery: L. M. Josey et al's Caswell Tr. 4, 533.5 fr sl 147-ac tr, BBB&C sur, pay 6027-97, perf 280 shots 6025-95, flow 214.82 bbls 39.2-gr, 10/64-in, gor 984/1, tp 825 lbs, cp 1050 lbs, comp 10-22-46 at 6365.

WYOMING OUTPOST

Fremont County—Gas Extension: Stanolind's Unit 3, c nw ne 14-33n-96w, Beaver Creek, Dakota 8993, Lakota 9108, flow 2,600,000 gas day after shot 110 qts 9118-9153, comp 10-30-46 at 9160.

WESTERN CANADA WILDCATS

Alberta Foothills Belt—Keystone Valley Failure: Roxana Oils' No. 3K, lsd 7 31-27-6w5th, abnd 10-27-46 at 5560.

Stolberg Failure: Imperial Oil-Shell of Canada's Stolberg 1, lsd 3 22-41-14w5th, abnd 10-29-46 at 13,747.

Central Alberta Plains—Deville Failure: Imperial Oil's Deville 1, lsd 9 36-51-20w4th, abnd 10-29-46 at 3636.

Fort Augustus Failure: Anglo Canadian, Home Oil, C. & E. Corp.'s Fort Augustus 1, lsd 7 29-55-21w4th, abnd 10-26-46 at 3313.

Provost Failures: Imperial Oil's Provost 5, lsd 7 22-38-3w4th, abnd 10-23-46 at 2404.

Commoil's Provost 1, lsd 5 24-35-2w4th, abnd 10-22-46 at 2487.

WESTERN CANADA OUTPOST

South Alberta Plains—Pinhorn Gas Extension: McColl-Frontenac-Union of Calif.'s No. 7C-6-4-8, lsd 7-6-4-8w4th, Bow Island Series pay, flow 15,000,000 gas, comp 10-18-46 at 2207.

New Map of Rangely by Geological Survey Ready

The U. S. Geological Survey has ready for distribution a new subsurface structure contour map of the Rangely oil field in Colorado, where there is promise for discovery of oil from deeper zones in the sequence of about 2000 feet of sedimentary rocks probably present below the Weber sandstone, only the uppermost 378 feet of which has thus far been tested.

Information on the map is brought up to Septemebr 13, last, at which time the field had 120 wells producing from the Weber sandstone and only one well drilled to that sandstone was dry.

This "Preliminary Map 67 of the Oil and Gas Investigations series," may be had at 25 cents each from Survey offices in Washington, Denver, Tulsa, or Casper, Wyo.

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"Do I? Well, the whole family was using the bath room mirror at the same time this morning, and I must have shaved my mother-in-law."

Hints for Householders

Boy (at the movies): "Can you see all right, darling?"

Girl: "Yes."

He: "Is there a draft on you?"

She: "No."

He: "Sure you're comfortable?"

She: "Absolutely."

He: "Then how about changing seats with me?"

When Two Agree

"I don't care for Jim. Half the time he wants to mug and the other half he wants to talk about literature."

"I don't blame you. I don't like books, either."

The Woman's Way

"That man is following us! What'll we do?"

"Match for him."

This Curious World

When she walks she's remindful of a busy switchboard—every line busy.

Chemical warfare: The eternal struggle between blondes and brunettes.

Old maid to robber: "Gracious! Frisk me again."

A veteran in the marriage game says: "Before I married I had six theories about bringing up children. Now I have six children and no theories."

"Am I my brother's kipper?" asks the herring.

A girl's last line of defense: "The folks will be home any minute now."

A night club is where they take the "rest" out of restaurant and put the "din" in dinner.

And He's Cooler Now

"Baby, how about melting you in my arms?"

"Nothing doing. I'm not that sort and you're not that hot."

Cause for Debate

"Johnny, to what class of the animal kingdom do I belong?"

"I dunno, teacher. Pa says you're an old hen and Ma says you're an old cat."

Life Can Be Simple

"Honey, do you know I'm something of a mind reader."

"So? Then why are you sitting at the other end of the davenport?"

Long Time No See

"I haven't seen you in ten years. Whatcha been doin'?"

"Ten years."

Better Bargain

"You say I'll die unless you operate? How much will it cost, Doctor?"

"Five hundred dollars."

"You'll have to come down a little. I had a better offer from an undertaker."

Had Him Going

"Judge, so help me, I wasn't going 60 miles an hour. In fact, I wasn't even going 30. I had slowed down to . . ."

"Whoa! We'd better close out this case before you back up and hit somebody. Ten dollars."

Busted Flush

"Why are you wearing that barrel? Are you a poker player?"

"Nope, but I spent a couple of hours with some guys who are."

What's in a Name?

The new head man at an insane asylum so angered a telephone operator that she snarled at him: "Nuts!"

"My dear young lady, do you know who I am?"

"No, toots, but I know where you are!"

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Maynord H. Steig, who has been Houston district geologist for Phillips Petroleum Company, has been transferred to Midland, Texas, as head of the company's western division geological department that embraces West Texas and Southeastern New Mexico. He succeeds **W. Dave Henderson,** who recently resigned to operate as an independent.

»

E. R. Raphael, manager of the Southern California Division, Shell Oil Company, was elected a director of the All-Year Club of Southern California, Ltd.

Paul Gosman has been made manager of advertising and sales promotion for Socony-Vacuum Oil Company, succeeding **Eben Griffiths,** retired. Gosman has been with the company since 1925. He was assistant to the general manager of automotive sales division, and became a member of the sales promotion department following the merger of Socony and Vacuum in 1931. Later he was made sales promotion manager. Griffiths has been with the company since 1916, and became advertising manager in 1931 when the merger was completed.

Merle J. Heald

H. H. Arnold

H. H. Arnold, Jr., has been made assistant manager of the Oklahoma-Kansas-Illinois Division of The Texas Company at Tulsa, replacing **Merle J. Heald,** who has been named division manager for the district upon retirement of **H. N. Pardee.** Arnold was general superintendent for the company at Salem, Ill., before this promotion.

»

Charles B. Clements has joined Consolidated Oil Company, Wichita Falls, to direct the production and engineering department. He was formerly the North Texas petroleum engineer for **R. C. Lipscomb,** San Antonio, and associates.

»

Ben Hurlbutt and **Frank Herring** have formed Ben-Franklin Exploration, Inc., as specialists in core drill exploration. Offices are in the Petroleum Building, Wichita, Kansas.

»

Byron Meredith, M. F. Clegg and **Lloyd M. Hunt,** Houston and Corpus Christi drilling contractors, have purchased the S. M. Morris interest in the drilling firm of Morris and Meredith, Inc., of Houston, together with the assets of the Clegg Drilling Company of Corpus Christi. The firm's name will be changed to Meredith, Clegg and Hunt and offices will be maintained in the Esperson Building, Houston. Meredith is president, Clegg vice president, and Hunt secretary and treasurer of the company.

»

C. E. Watson will be in charge of marine and construction engineering, and **Jack Brown** in charge of mechanical engineering for Power Application & Manufacturing Company, Houston.

»

Lawrence B. Kelly has been promoted to assistant manager of Standard Oil Company (Indiana) at Omaha.

»

F. I. L. Lawrence has become a member of The American Petroleum Institute committee on analytical research.

»

Ed. J. Hamner, assistant chief geologist in charge of production geology and geological problems relating to development for Humble Oil & Refining Company, Houston, will present a paper, "A Review of Well Logging Practices," before the Gulf Coast Section of AIME at the Texas State Hotel, Houston, November 13 at 6:30 p.m.

MORE OPERATORS ARE DISCOVERING THE EFFICIENCY OF JP RODS AND LINERS

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Henry Chalfant was elected a director of The National Supply Company to fill the vacancy created by the retirement of **P. J. Shouvlin.** Chalfant is assistant secretary of the company. He was a lieutenant colonel in the Army Air Forces during the war. He is a descendant of one of the founders of Spang-Chalfant and Company, a division of National Supply Company.

Henry Chalfant

Dr. George R. Gray, manager of the Houston laboratory of Baroid Sales Division, National Lead Company, spoke on "Chemistry of Oil-Well Drilling Fluids" before the South Texas Section of the American Chemical Society in Corpus Christi, Texas, October 25.

Dr. John Johnston has retired as director of the research laboratory of United States Steel Corporation and will be succeeded by **Dr. J. B. Austin,** assistant director. The two have been associated since the inception of the laboratory in 1928. Johnston is a native of Perth, Scotland. After receiving his doctorate in 1908 he joined the Geophysical Laboratory in Washington, D. C. He taught chemistry at Yale University.

T. E. ("Ed") Wilde has been added to the technical and process development staff of Griffin Chemical Company, San Francisco. For 15 years he has acted in various technical capacities for Union Oil Company, most recently as assistant to the manager of the chemical products division in Los Angeles.

C. A. McClelland is manager of Mid-Continent direct sales for International Derrick & Equipment Company, and will have headquarters at the central sales office in Dallas. He has been associated with the company for more than ten years.

Elton Sterrett, a member of THE OIL WEEKLY editorial staff from June, 1940, to June, 1945, has returned as engineering editor. During his absence he was executive secretary of The National Association of Corrosion Engineers, and until May, 1946, was also managing editor of the Association's official publication, *Corrosion.* Sterrett is a graduate mechanical engineer, with a petroleum background of ten years' experience in the East Texas field, where he was assistant chief engineer for Arkansas Pipe Line Company. Prior to that he was employed by several companies operating tankers.

Elton Sterrett

L. J. Renner has been appointed Mid-Continent wire rope sales manager for Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation. His offices are in Fort Worth National Bank Building, Fort Worth. He was formerly in charge of wire rope sales in the Chicago district office.

W. R. Everett, Jr., has been appointed store manager at Wichita Falls, Texas, for The Continental Supply Company. He succeeds **H. H. Waters,** resigned.

H. E. Summerford, formerly district geologist for Kerr-McGee Oil Industries, is in charge of a new stratigraphic logging service at Casper, Wyo., which operates in conjunction with Chemical Laboratories, Inc., under **J. G. Crawford,** former U. S. Geological Survey technician.

T. Ames Wheeler, formerly with U. S. Steel Corporation, has been appointed statistician of the Allegheny Ludlum Steel Corporation.

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John A. Clemens

John A. ("Jack") Clemens, veteran Martin-Decker sales engineer, is on a six months trip to South America. Clemens' itinerary will include Trinidad, Colombia, Ecuador, Peru, Chile, Argentina, Brazil, and Mexico. On his return, Clemens will again direct Martin-Decker operations in the Gulf Coast and Mid-Continent from his Houston headquarters.

Deaths

R. R. Griffin, former vice president in charge of marine transportation for Shell Oil Company, died October 22 at Oakland, Calif., after a long illness. He retired in August after 25 years of service with the company. He was first employed as a clerk with Shell Oil Company of California, San Francisco, in 1921. By 1930 he was assistant to the vice president in charge of manufacturing, and a year later he was transferred to Shell Union Oil Corporation in New York and put in charge of marine transportation and supplies.

»

Earle C. Emery, 70, formerly associated with his father in the oil industry at Bradford, Penn., died October 31 at Clearwater, Fla. Emery was president of Minard Run Oil Company, Lewis Emery, Jr., Inc., and Emery Hardware Company, all of Bradford; and founded Citizens National Bank of Bradford. He helped form the Bradford Producers Association.

»

Thomas Lowry Bailey, governor of Mississippi, died November 2. As governor, Bailey was chairman of the State Oil & Gas Board and was instrumental in Mississippi adopting strong conservation measures dealing with natural resources. He was succeeded by Fielding Wright, lieutenant governor. Bailey became a member of the state house of representatives in 1915 and was elected governor in 1944. He had been ill since undergoing an operation in New Orleans during the summer.

»

Warren Walker, 51, accountant for Sunray Oil Corporation, died in Tulsa November 4 following an operation. A native of Alabama, he moved to Muskogee, Okla., when his father, the late **George H. Walker** established the Osage Cotton Oil Company. He was an employe of Darby Petroleum Company when that firm was taken over by Sunray.

»

Merle F. Hampton, 61, Tulsa, president of M. F. Hampton & Company, pipe line equipment firm, was killed November 1 in an auto accident in Kansas City, Mo.

»

John J. Hughes, 80, Tulsa, an employe of the Mid-Continent Petroleum Corporation for a number of years, died at his home in Tulsa November 5 of a heart attack.

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HOUSTON

George P. Torrence Elected Head of Link-Belt Company

George P. Torrence has succeeded William C. Carter as president of Link-Belt Company. He was executive vice president. He entered the company's employ in 1911 as a draftsman and has served in many capacities with the company's divisions and subsidiaries. He was manager of the Indianapolis operations from 1926 to 1932, and president from 1932 to 1936.

Carter, who has been Link-Belt's president since 1942, will continue as a director of the company and as chairman of the executive committee whose other members are Howard Coonley and Russell Livermore. He maintains connection with the company in a consulting capacity.

Export Department Manager Is Chosen by Baash-Ross

Frank E. Bergeron has been appointed manager of the export department of Baash-Ross Tool Company, with headquarters in New York. He spent several years in major fields in the West following graduation from the University of California as a mining engineer and geologist, and became connected with Baash-Ross 11 years ago. He has held various manufacturing and sales posts in the organization.

Dixie Chemical Moves Into New Houston Warehouse and Offices

Dixie Chemical Company has moved into its new warehouse and office at 718 North Drennan Street, Houston. Officers of the company are Stanley C. Morian, president, and Gene Huff, secretary-treasurer. The company handles industrial chemicals for the drilling, producing and refining branches of the petroleum industry, its stocks including chemicals for corrosion control, water treating, chemical cleaning for all types of scale, etc.

Oil Country Division Sales Head Named by Youngstown Company

Youngstown Steel Products Company of California announced organizational changes effective November 1. R. I. Whelan, with over 20 years of selling experience in California oil fields for Youngstown and Republic Supply Company, is now manager of sales, oil country division. H. N. Perram, an accountant with the company since 1941, is treasurer and assistant secretary. He succeeds L. B. Wiggins, who resigned to become manager of A& W Truck Rental Company. Richard Graham, formerly with Baker Oil Tool Company, has joined the company to become order clerk, sales department.

Gray Supply Company, Houston, To Become Rental Division

The Gray Supply Company will be operated as the Gray Rental Division of the American Iron & Machine Works Company. The Gray Rental Division has Gulf Coast headquarters at 1801 Semmes Street, Houston, under the management of C. D. Fitch and his assistant, C. L. Braswell, and has branches at Shreveport and Harvey, La.; and Alice and Odessa, Texas. The company operates a rental service on drill pipe, drill collars, kellys, blowout preventers, core barrels and pipe handling equipment.

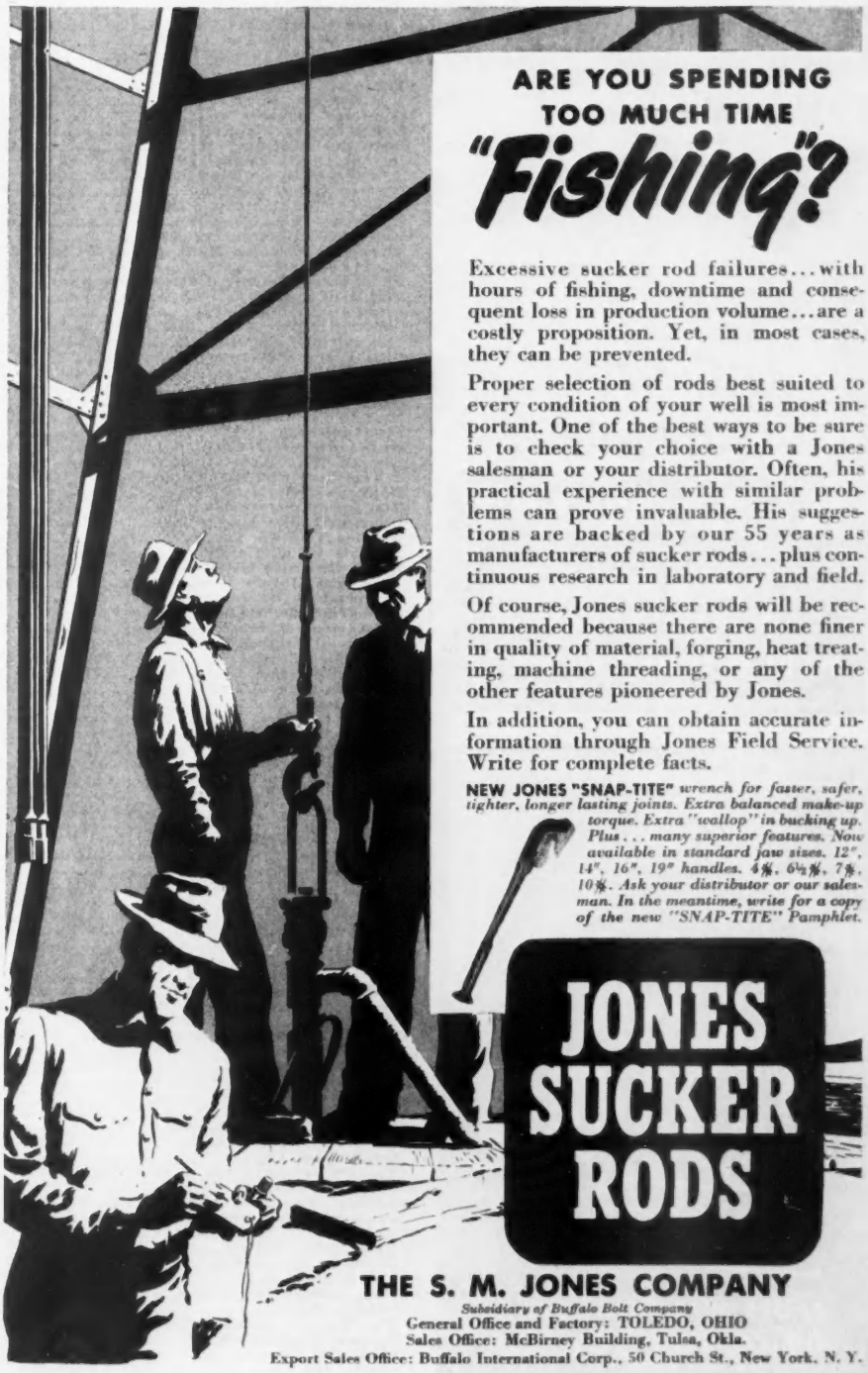
Bovaird Opens Store

Bovaird Supply Company has established a store at Pauls Valley, Okla., to be opened December 1. It will be under the direction of V. P. McAnally of Oklahoma City, and is the 14th completely stocked store in the chain operated by the company, which is celebrating its diamond anniversary this year.

Dresser Firms Supply Equipment For France's Increased Needs

Two Dresser Industries, Inc. subsidiaries are shipping equipment required by increasing activity in Southern France. International Derrick & Equipment Company is supplying drilling equipment, and Clark Bros. Company, Inc. of Olean, N. Y., has completed compressors for installation in a plant now being erected in the St. Marcet field.

John B. O'connor, executive vice president of Dresser, returned from a month in England and on the Continent to report on renewed refining activities in France and Czechoslovakia.



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PAGES 3079 THRU 3098 IN THE COMPOSITE CATALOG

Advertisers' Index

EDITORIAL INDEX, PAGE 37

* Indicates detailed information on products and services included in 1943-44 edition of Composite Catalog of Oil Field and Pipe-Line Equipment.

Airflite, Inc. ---- 126
Amerada Petroleum Corp. ---- 87
American Cyanamid Co. ---- 26
*American Iron & Machine Works Co. ---- 125
*American Roller Bearing Co. ---- 108
*American Sand-Banum Co. ---- 118
*American Steel & Wire Co. ---- 64
Asiatic Petroleum Corp. ---- 106
*Axelson Manufacturing Co. ---- 15
*Baker Oil Tools, Inc. ---- 40
Wm. M. Barret, Inc. ---- 128
Beaumont Well Works Co. ---- 128
*Bethlehem Supply Co. ---- 75
*Big Four Machine & Supply Co. ---- 87
*Black, Sivalls & Bryson, Inc. ---- 19
*Bowen Company of Texas ---- 91
Bowser, Inc. ---- 119
*The Brewster Co. ---- 11
*Byron Jackson Co. ---- 60-61
*Cameron Iron Works, Inc. ---- 71
*Chicago Bridge & Iron Co. ---- 94-95
Chrysler Corp. ---- 113
Dan L. Clark Drilling Co. ---- 110
*Climax Engineering Co. ---- 97
Climax Molybdenum Co. ---- 72
The Colorado Fuel & Iron Corp. ---- 107
Columbia Steel Co. ---- 64
The Continental Supply Co. ---- 42
*The Cooper-Bessemer Corp. ---- 100-101
*Cummins Engine Co. ---- 63
Dallas Aircraft Sales, Inc. ---- 83
Deep Rock Oil Corp. ---- 112
Detroit Diesel Engine Division
General Motors Corp. ---- 7
*Dresser Industries, Inc. ---- 24
*Dresser Manufacturing Division
Dresser Industries, Inc. ---- 24
*Emerol Manufacturing Co. ---- 84
The First National Bank & Trust Co. ---- 115
Ford Motor Co. ---- 56
Ft. Worth Clearing House Association ---- 102
Ft. Worth Laboratories ---- 128
Franks Machine Co. ---- 93
*Gardner-Denver Co. ---- 3
*The Garlock Packing Co. ---- 83
*Gaso Pump & Burner Manufacturing Co. ---- 1
Gemco Oil Tools, Inc. ---- 30
General Motors Corp. ---- 7 and 25
*Gray Tool Co. ---- 38
*H. P. Gott Manufacturing Co. ---- 121
*The Guiberson Corp. ---- 35
*Harisburg Steel Corp. ---- 103
*Hazard Wire Rope Division
American Chain & Cable Co. ---- III Cover
Helmerich & Payne, Inc. ---- 110
Houston Laboratories ---- 123
Houston Radio Supply Co. ---- 128
*Hughes Tool Co. ---- I Cover
Humble Oil & Refining Co. ---- 8
Hyatt Bearings Division
General Motors Corp. ---- 25
Independent Exploration Co. ---- 6
Industrial Chemicals Division
American Cyanamid Co. ---- 26
Industrial Engine Division
Chrysler Corp. ---- 113
Interstate Drop Forge Co. ---- 105
J. P. Machine & Tool Co. ---- 124
W. P. Jenny ---- 126
*Jensen Brothers Manufacturing Co. ---- 104
*The S. M. Jones Co. ---- 127
Jones & Laughlin Supply Co. ---- 9
Earle M. Jorgensen Co. ---- Insert 16-17
Joy Manufacturing Co. ---- 12-13
*Justrite Manufacturing Co. ---- 122
King Oil Tools ---- 79
L & H Machine Works ---- 27
The R. K. LeBlond Machine Tool Co. ---- 96
*LeRoi Co. ---- 117
*A. Leschen & Sons Rope Co. ---- 109
Lion Oil Co. ---- 79
A. M. Lockett & Co. ---- 91
Lone Star Cement Corp. ---- II Cover
The Lufkin Rule Co. ---- 126
*Magnet Cove Barium Corp. ---- 69
Marlow Pumps ---- 17
Marmon-Herrington Co. ---- 16
Mid-Continent Petroleum Corp. ---- 33
The Midwest Oil Register ---- 126
*Miller Sand Pump Co. ---- 96
*Mission Manufacturing Co. ---- IV Cover
Mudrite Chemicals ---- 128
Murphy Diesel Co. ---- 34
National Bank of Commerce ---- 4
National Tube Co. ---- 20-21
*Naylor Pipe Co. ---- 111
New Bedford Cordage Co. ---- 84
*Oil Well Supply Co. ---- 59
Owen Tool Co. ---- 123
*The Parkersburg Rig & Reel Co. ---- 67
*Patterson-Ballagh Corp. ---- 49 and 123
*Pelican Well Tool & Supply Co. ---- 112
*Penberthy Injector Co. ---- 92
*Rector Well Equipment Co. ---- 118
*Reed Roller Bit Co. ---- Insert 88-89
Republic Steel Corp. ---- 28-29
*The Ridge Tool Co. ---- 91 and 93
Rolo Manufacturing Co. ---- 2
Sandlin Bros. ---- 106
The Second National Bank of Houston ---- 31
Seismic Explorations, Inc. ---- 32
Shell Oil Co. ---- 106
Skelly Oil Co. ---- 14
Southern Engine & Pump Co. ---- 93
*Southern Mill & Manufacturing Co. ---- 10
*Spang-Chalfant Division
The National Supply Co. ---- 76-77
*Standco Brake Lining Co. ---- 126
Sun Oil Co. ---- 116
Thomas Motor Freight ---- 110
Thompson-Hayward Chemical Co. ---- 87
*Thompson Tool Co. ---- 114
The Torrington Co. ---- 22
Trading Post Section ---- 120
*Tretolite Co. ---- 23
*The Union Chain & Manufacturing Co. ---- 84
United States Steel Export Co. ---- 20-21 and 64
United States Steel Corp. ---- 20-21, 59 and 64
The University of Texas ---- 106
*Waukesha Motor Co. ---- 18
The Weld Inspection Laboratory ---- 128
*Wheeling Machine Products Co. ---- 128
*Wickwire Spencer Steel Division
The Colorado Fuel & Iron Corp. ---- 107
Williams Bros. Corp. ---- 36
*Wilson Manufacturing Co. ---- 5

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